DECLARATION

This is to certify that this project is an original work and was done by us and it has not been submitted elsewhere for the requirement of any degree or diploma or for any other purposes except for publication.

OBEDI OBADIAH Mwendapeke

Signature…….

MARIE WILONDJA Tchoke

Signature ……

APPROVAL

This is project entitled "**Bank Customers Management System**" submitted by **OBEDI OBADIAH Mwendapeke**, and **MARIE WILONDJA Tchoke**, to the Department of Computer Science, at KIGALI INDEPENDENT UNIVERSITY, is accepted as satisfactory for partial fulfilled of the requirements for the Bachelor degree in Computer Science.

DATE

……..……/ …..……. /……

Signature

…….

Supervisor: Marcellin NZAYISENGA HABARUGIRA

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DEDICATION

We dedicate this research project to our:

- Parents;
- Brothers;
- Sisters;
- Relatives and to everyone who contributed to the success of our project financially, scientifically, and morally.

In memoriam

NYANYA MWENDAPEKE Amos

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LIST OF ABBREVIATIONS AND ACCRONYMS

API	: Application Programming Interface
DBMS	: Database Management System
DFD	: Data Flow Diagram
DLL	: Dynamic Link Languages
ERD	: Entity Relationship Diagram
IDE	: Integrated Development Environment
No SQL	: Not-only SQL
NRI	: Non-Resident Indian
RAM	: Random Access Memory
RDBMS	: Relational Database Management System
RDSMS	: Relational Data Stream Management Systems
ROM	: Read Only Memory
SDLC	: Software Development Life Cycle
SQL	: Structured Query Language
SSADM	: Structure Systems Analysis and Design Methodology

ABSTRACT

The main purpose of building and designing this project called "**The Bank Customers Management Desktop Application**" is to give Banks the ability to manage with efficiency their customers.

The main objective of this project is to develop, to improve and to implement the good performance of managing customers in a bank and to have a big interaction between a bank and customers effectively and efficiency.

The big target of this project is to design and develop software which will satisfy and respond to the customers need in security by performing tasks such as customer account creation, manage customers information's, transactions making, being in closer communication with customers using messages and printing transactions slips.

During our development we have used methodologies such as the data collection methodology and the software development methodology. The data collection methodology that we used during our project is the interview techniques because it helped us to organize a conversation in order to obtain important information about personal opinions. We used the documentation technique because it helped us to get concerned information from books in the library, websites, and courses. Thereafter, we used the observation technique because it helped us as well to observe by selecting, listening, reading what the banks are doing when managing their customers and provide banks customers services. We used the software development methodology called Software Development Life Cycle (SDLC) which helped us to develop and design best and high quality software in a good way.

In addition this project is used in managing bank customers services such as the bank account creation by entering personal and applicant details that will be stored automatically in the database. It's also used to manage and to print automatically all transactions slips such as the Deposit; Withdrawal, Loan and Repayment transactions. The administrator is also allowed to manage all customers details by editing, deleting and updating those stored customers informations. It will be also able to communicate all feedback of provided services to customers using the messages communications.

In conclusion, we developed and designed our project that has a purpose of facilitating banks to manage their customers without complications and make customers transactions efficiently.

Finally, we recommend to other researchers in the future to implement another version of this project and add other features such as the customer money transfer, the loan transactions of a group of people, the human resources management that will make this project more helpful.

CHAPTER 0. GENERAL INTRODUCTION

0.1 BACKGROUND

As we know the technology is defined as the application of scientific knowledge for practical purposes, and is all about the use and knowledge of techniques and processes for producing goods and services especially in companies and industries.
So Nowadays, the technology is going to be very more important in much kind of aspects for any developing bank services in recent days.
The bank does not need to take for a long-standing dealing with the manual techniques to save information of customer which can lead to a very serious waste of time, so budding technologies have altered the banking industry from paper and conventional approach to digital approach.

Today, banks are looking beyond the transactions to the full opportunity on how to manage their customers. Accordingly, they are moving beyond managing clients as simple contacts to a whole new level of client relationship management, crafting a superior commercial client experience that gives the bank a competitive advantage and a more loyal, profitable and committed customers. The main intention behind the commencement of electronic banking services is to provide the customers with an alternative that is more responsive and with less expensive options.

Now the right time of solving all those problems that many banks are facing just because of the deficiency of the computerized technology.

As the major aim of the bank is to serve customers in good conditions banks are facing, the reason why we have been concentrated to design and to implement the project of customer management to make easier the way banks are working when managing customers and to store many services or activities and among those services we can identify some of them such as the transaction service, withdrawal service, deposits service, loan, reimbursement, to describe how the patient is going to fulfill the admission form, to send feedback to customers(clients), to store all customer informations in the database in order to manage(edit, delete,) informations.
Thus a Bank customer’s management system was introduced as an important component to increase the quality of managing customers and specially to resolve the long waiting times, respite and queue of customers.

At present most of the banking applications are yet to respond to the rapidly growing attacks on their customer private data. Issues suck fraud operating within a conventional environment. However current systems are still trying to cope with the existing institutional structure, which is really meant for usual banking system only and not managing their customer's information more effectively.

Lack of adequate security measure is making it really challenging to successfully transform the bank customer's management systems from where it is now to where it should be.

0.2 PROBLEM STATEMENT

0.2.1 Definition:

The problem statement can be defined as written description of the issue or set of issues that would be addressed by the concerned research work and it identifies the gap between the current (problem) state and the desire (goal) state of a process or product. (*Kush, Max, June 2015. "The Statement Problem". Quality Progress*)

It main purpose is to identify and explain the problems.

During the conception of this project we will be concentrated on how to give the difference between the current technology and the future technology with the use of some techniques and methods, and we will provide how to solve the problem of managing customers and to send feedback differently to the current one.

Look at the current system we are facing some problems such as:

- **The less of the customer's private datas in the company**

During the development of our project we realize that customer private informations are lost cause of the lack of the computerized system that we'll save all concerned datas.

- **The rapid problem of the transaction processes.**

During the development of our project we realize that when doing the bank transactions, the customers has to spend a lot of time waiting to be served.

- **The lack communication between the bank and their customers**

During the development of our project we realize that the bank is not in a good communication with customers who are not closer with the bank.

- From the problems mentioned above, questions can be formulated in this way:
    - How the bank customers management will help banks to satisfy their customers?
    - How to design and develop the bank customers management system?
    - How banks can communicate with their customers?

0.3 HYPOTHESIS

0.3.1 Definition

A hypothesis can be defined as an idea or explanation that you test through study and experimentation. A hypothesis is something more than a wild guess but less than a well-established theory. (*Hilborn, Ray; Mangel, Marc ,1997; Richard Feynman, 1965 "The Character of Physical Law" p.156),*

It can be define also as a proposed explanation for a phenomenon. For a hypothesis to be a scientific hypothesis, the scientific method requires that one can test it. Scientists generally base scientific hypotheses on previous observations that cannot satisfactorily be explained with the available scientific theories.

Even though the words "hypothesis" and "theory" are often used synonymously, a scientific hypothesis is not the same as a scientific theory. A working hypothesis is a provisionally accepted hypothesis proposed for further research, in a process beginning with an educated guess or thought. *(Hilborn, Ray; Mangel, Marc (1997). "The ecological detective: confronting models with data. Princeton University Press"*. p. 24)

In order to manage customers the bank need to secure and to prevent the company from the lack of customer's private datas.

The big target is to design and develop an application to satisfy customers as much as possible, and will help to perform some transaction as deposit, withdrawal and loan, will prevent from the lack of important informations.

To be closer with customers the bank must provide a printed paper that maintains all information of the company.

For each step of the bank process, our software will be able to perform some tasks such as:

- Customer admission and Account creation;
- Edit and Delete customer informations;
- View customer informations;
- Perform transactions (Deposit, Withdrawal and Loan);
- Being in closer communication with customers using messages;
- Printing Transactions (Deposit, Withdrawal, Loan and Repayment) Slips.

The development of this software helps us and facilitates the speed and good performance of bank services.

0.4 PROJECT OBJECTIVE

Our project has two objectives that are General objectives and Specific objectives.

0.4.1 General Objective

The main objective of this project is to develop, to improve and to implement the good performance of managing customers in a bank and to have a big interaction between a bank and customers effectively and efficiency.

0.4.2 Specific Objective

Our project is entitled "**Bank customers management system**" has others different objectives such as:

a) Providing printed Reports
   - The deposit Slips and Reports;
   - The withdrawal Slips and Reports;
   - The Loan Slips and Reports;
   - The List of registered customers;
   - All available communications.

b) To record automatically Informations
   - To Save customers private datas;
   - To save all transactions(Deposits, Withdrawals Loans and Repayment) informations;
   - All communications details.

c) To create a database which will store all informations
   - To store customers informations;
   - To store all transaction process;
   - To store all communications.

d) To have efficiency communication with customers
   - To share services informations with the customers;
   - Transactions process communications.

e) To describe and print the customers list.
   - To print all available customers in the system.

0.5 INTEREST OF THE SUBJECT

The interest of this subject is improve the way of work when talking about bank services specially when dealing with customers safety

0.5.1 Personal Interest

During the development of this software, it will help us to:

- To put to practice the knowledge that we got from the class and the reality on the working field;

0.5.2 Public Interest

At the end of this project, the banks will be able:

- To serve customers effectively and in a quick way;
- To have all prevention from the lack of data and all time spending by manual computation operations.

0.6 SCOPE OF THE PROJECT

Every scientific work must be delimited in three ways:

- The scope in space;
- The scope in time;
- The scope in domain.

0.6.1 Scope in space

Our research project work is located in the DRC Country, in the North-Kivu Province precisely in Goma Town, in the Township of Goma.

0.6.2 Scope in time

This project is built in 2020 with the purpose of solving the problem of customers management within IMARA Cooperative of Savings and Credits.

0.6.3 Scope in domain

Particularly this project is built with the purpose of solving the problem of managing customers in a bank.

0.7 ORGANISATION OF THE PROJECT

This project contains six chapters:

- ***Chapter 0: The General introduction***: This chapter is concerned with problem statement, problem scope and project purpose;
- ***Chapter 1: Literature Review***: This chapter deals with the theoretical concepts it means it provides a description, summary and evaluation of each source;
- ***Chapter 2: Methodology:*** This chapter covers the data collection methodologies to be used in the project schedule.
- ***Chapter 3: System analysis and design***: In this chapter we analyze the current system, the new one then the tools and the system requirements;
- ***Chapter 4: System implementation:*** In this chapter we will proceed by showing exactly how the system will work, in other words, we will:
  - Show how the information system should be built (i.e. physical system design).
  - Ensure that the information system is operational and used.
  - Ensure that the information system meets quality standard (i.e. quality assurance).
- ***Chapter 5: Conclusion and recommendations:*** in this chapter we provide the general conclusion

CHAPTER 1. LITERATURE REVIEW

1.1 INTRODUCTION

The main purpose of this chapter is to help the reader to get a complete, concise and clear understanding, comprehensive and practical and explanation used in this project.

Our study will provide the good way to manage customers information technologically, a well understanding of bank customers basic services and more on customers perceptions regarding banking services.

This project aims to provide critical information for managing the bank customers more effectively and understanding customer needs, matching customer needs to the best offers services.

Rather, to encourage financial services providers in making informed choices in the challenges, opportunities, effective practices in providing a safe and secured customer management and the best satisfaction of the customer and for profit maximization to the bank.

1.2 CONCEPTUAL REVIEW

1.2.1 Definition of concepts

1. **Design**

A **design** is a plan or specification for the construction of an object or system or for the implementation of an activity or process, or the result of that plan or specification in the form of a prototype, product or process.

The verb to **design** expresses the process of developing a design. In some cases, the direct construction of an object without an explicit prior plan (such as in craftwork, some engineering, coding, and graphic design) may also be considered to be a design activity. The design usually has to satisfy certain goals and constraints, may take into account aesthetic, functional, economic, or socio-political considerations, and is expected to interact with a certain environment. Major examples of designs include architectural blueprints, engineering drawings, business processes, circuit diagrams, and sewing patterns. (*Dictionary meanings in the Cambridge Dictionary of American English, at Dictionary.com , esp. meanings 1–5 and 7–8 and at Ask Oxford)*

2. Implementation

In computer science, an implementation is a realization of a technical specification or algorithm as a program, software component, or other computer system through computer programming and deployment. Many implementations may exist for a given specification or standard. For example, web browsers contain implementations of World Wide Web Consortium-recommended specifications, and software development tools contain implementations of programming languages.

A special case occurs in object-oriented programming, when a concrete class implements an interface, in this case the concrete class is an *implementation* of the interface and it includes methods which are *implementations* of those methods specified by the interface. *(The National Implementation Research Network, "Implementation definition", Wikipedia.com).*

3. Bank

A **bank** is a financial institution that accepts deposits from the public and creates a demand deposit while simultaneously making loans. Lending activities can be performed either directly or indirectly through capital markets.

Due to the importance of banks in the financial stability of a country, most jurisdictions exercise a high degree of regulation over banks. *(Compare: "Bank of England". Rulebook Glossary. 1 January 2014.)*

4. Bank Customers

In sales, commerce and economics, a **customer** (sometimes known as a **client**, **buyer**, or **purchaser**) is the recipient of a good, service, product or an idea - obtained from a seller, vendor, or supplier via a financial transaction or exchange for money or some other valuable consideration.

Therefore, **bank customers** are people from the public which is a financial institution that accepts deposits from the public and creates a demand deposit while simultaneously making loans.

5. Management

Management (or **Managing**) is the administration of an organization, whether it is a business, a not-for-profit organization, or government body. Management includes the activities of setting the strategy of an organization and coordinating the efforts of its employees (or of volunteers) to

accomplish its objectives through the application of available resources, such as financial, natural, technological, and human resources.

The term "**Management**" may also refer to those people who manage an organization called Managers.

Social scientists study management as an academic discipline, investigating areas such as social organization and organizational leadership. *(Waring, S.P., 2016. Taylorism transformed: Scientific management theory since 1945. UNC Press Book.)*

6. Report

A **report** is a document that presents information in an organized format for a specific audience and purpose. Although summaries of reports may be delivered orally, complete reports are almost always in the form of written documents. (*Madan, Poonam (2016–2017). Language proficiency in English. 28/115, jyoti block, sanjay place, Agra-2: Agarwal publication. p. 138)*

7. Project

In project management a project consists of a temporary endeavor undertaken to create a unique product, service or result. Another definition: the project is a management environment that is created for the purpose of delivering one or more business products according to a specified business case. Projects can also be seen as temporary organization. *(R. Max Wideman (2004), A Management Framework: For Project, Program and Portfolio Integration. p. 30)*

8. System

A **system** is a group of interacting or interrelated entities that form a unified whole. A **system**, surrounded and influenced by its environment, is described by its boundaries, structure and purpose and expressed in its functioning. **Systems** are the subjects of study of **systems** theory. (*"Definition of system". Merriam-Webster. Springfield, MA, USA. Retrieved 2019-01-16)*

9. Software

Computer Software means computer instructions *or* data. Anything that can be stored electronically is software, in contrast to storage devices and display devices which are called hardware. *(Vangie Beal, 2012, "Software Definition & Meaning", webopedia.com)*

In computer science and software engineering, computer software is all information processed by computer systems, programs and data.

Computer software includes computer programs, libraries and related non-executable data, such as online documentation or digital media. Computer hardware and software require each other

and neither can be realistically used on its own. (*The new social Operating System 2012, Wikipedia.com*).

10. Desktop application

Desktop application is any program that can run and be installed and used to perform specific tasks on a single device. Some desktop programs in a networked environment cans also be used by multiple users.

A desktop application is one that runs in the standard windows browser, as opposed to a full-screen tablet application.

Desktop programs are mounted on a desktop computer for personal use or work. (*Paul Monk, September 8,"Desktop Application meaning", 2014*)

11. User Interface

The User Interface (UI) of a computer program is the part that handles the output to the display and the input from the person using the program. The goal of effective UI is make the user's experience easy and intuitive, requiring minimum effort on the user's part to receive maximum desired outcome. (*Myers, B.A., 1995. User interface software tools. ACM Transactions on Computer-Human Interaction (TOCHI), 2(1), pp.64-103)*

1.2.2 Tools and languages used in implementation

1. C-sharp (C#)

C# (pronounced "C-sharp") is a general-purpose, multi-paradigm programming language encompassing static typing, strong typing, lexically scoped, imperative, declarative, functional, generic, object-oriented (class-based),and component-oriented programming disciplines. (*C# Language Specification.PDF (4th ed.). Ecma International. June 2006. Retrieved January 26, 2012)*

C# was developed around 2000 by Microsoft as part of its .NET initiative and later approved as an international standard by Ecma (ECMA-334) in 2002 and ISO (ISO/IEC 23270) in 2003. It was designed by *Anders Hejlsberg*, and its development team is currently led by *Mads Torgersen*, being one of the programming languages designed for the Common Language Infrastructure (CLI). The most recent version is 9.0, which was released in 2020 in .NET 5.0 and included in Visual Studio 2019 version 16.8. *(Visual Studio 2019 Preview Release Notes". docs.microsoft.com)*

2. Microsoft SQL Server

Microsoft SQL Server is a relational database management system developed by Microsoft. As a database server, it is a software product with the primary function of storing and retrieving data as requested by other software applications—which may run either on the same computer or on another computer across a network (including the Internet). Microsoft markets at least a dozen different editions of Microsoft SQL Server, aimed at different audiences and for workloads ranging from small single-machine applications to large Internet-facing applications with many concurrent users.

The history of Microsoft SQL Server begins with the first Microsoft SQL Server product—SQL Server 1.0, a 16-bit server for the OS/2 operating system in 1989—and extends to the current day. (*"Editions and supported features of SQL Server 2019 (15.x)", microsoft.com)*

SQL comprises of 3 major sub-languages:

- **Data Definition Language** (**DDL**): to create and modify the structure of the database;
- **Data Manipulation Language** (**DML**): to perform Read, Insert, Update and Delete operations on the data of the database;
- **Data Control Language** (**DCL**): to control the access of the data stored in the database. (*SQL Notes for Professionals.pdf, P2, www.GoalKicker.com*).

3. Visual Studio Community

Microsoft Visual Studio community is an Integrated Development Environment (IDE) form Microsoft.

It is used to develop computer programs, as well as websites, web apps, web services and mobile apps. Visual Studio uses Microsoft software development platforms such as Windows API, Windows Forms, Windows Presentation Foundation, Windows Store and Windows SilverLight.

It can produce both native code and managed code.

The history of Microsoft Visual Studio begins with the first product which was ***Visual Studio 97,*** launched 19th March 1997.

This package can be considered as a learning IDE for students, hobbyists and newcomers to Visual Studio programming. *(Microsoft Community, November 2020 "Visual Studio 2019 Release Notes". docs.microsoft.com.)*

4. Bunifu UI Frameworks

Bunifu UI controls are driven tools to help you to build awesome desktop application interface. It guarantees great user experience in apps and reduces development time for Microsoft Visual Studio .NET software.

We currently target C# languages and the product is offered as DLL imported into the Visual Studio environment.

The DLLs are installed in the .NET environment and is built on top of the Win Forms. It enables developers to drag and drop hence faster coding.

It empowers developers to:

- Improve productivity
- Built modern stunning designs.

(Microsoft.docs "Bunifu Framework - Visual Studio .NET UI tools" Bunifu Technologies, LTD, Microsoft.com)

5. Cristal Report

Cristal Report is a popular Windows based report writer solution that allows a developer to create reports and dashboards from a variety of data sources with a minimum of code to writer.

Cristal Report is owned and developed by SAP.

It is designed to produce reports from virtually any data source. Formulas, cross-tabs, sub-reports and conditional formatting help make sense of data and uncover important relationships that might otherwise be hidden. Data visualization tools such as geographic maps and graph communicate information visually to help in understanding data analysis and it can also publish in a variety of format including Microsoft Word and Excel, e-mail and over the web.

6. Twilio API

Twilio is an American cloud communications platform as a service (CPaaS) company based in San Francisco, California. Twilio allows software developers to programmatically make and receive phone calls, Send and receive text message and perform other communication functions using its web service APIs.*(Kincaid Jason "Twilio's telephony API Now Lets Applications Send and Receive SMS Messages", February 9, 2010)*

1.2.3 Database concepts

1. Information

Information is associated with data, as data represent values attributed to parameters, and information is data in context and with meaning attached. Information also relates to knowledge,

as knowledge signifies understanding of an abstract or concrete concept. *("Information - Definition of Information by Merriam-Webster". Merriam-webster.com)*

2. Data

Data can be defined as information, especially facts or numbers, collected to be examined and considered and used to help with making decisions. Or information in an electronic form that can be stored and used by computer. (*"Definition of Data" by merriam-webster.com, 1646*)

3. Database

Database is an organized collection of data, generally stored and accessed electronically from a computer system. Where database are more complex they are often developed using formal design and modeling techniques. *(Ullman, Jeffrey, Widom, Jennifer (1997). A First Course in Database Systems)*

4. Database security

Database security refers to the range of tools, controls and measures designed to establish and preserve database confidentially since it's the element that's compromised in the most breaches.

Database security is a complex and challenging endeavor that involves all aspects of information security technologies and practices. (*IBM Cloud Education. August27, 2019 Wikipedia.com*)

5. Data Management System (DBMS)

Data Management System (DBMS) is software designed to store, retrieve, define and manage data in a database.

DBMS software primarily functions as an interface between the end user and the database, simultaneously managing the data. The database engine and database schema in order to facilitate the organization and manipulation of data.

A database management system functions through the use of system commands, first receiving instructions from database administrator in DBMS, then instruction the system accordingly, either to retrieve data, modify data, or load existing data from the system.

6. Table

A table is a collection of related data held in a table format within a database; it consists of columns and rows.

In relational databases, and flat file databases, a *table* is a set of data elements (values) using a model of vertical columns (identifiable by name) and horizontal rows, the cell being the unit where a row and column intersect. *(Merriam-Webster, "table definition", May 29, 2012.)*

7. Records

A record is a database entry that may contain one more values. Group of records are stored in a table, which defines what types of data each record may contain. Database may contain multiple tables which may each contain multiple records. (*Techterms.com. August 25, 2012*)

8. Field

A database field is a single piece of information from a record. A database record is a set of fields.

9. Query

A query is a way of requesting information from the database. A database query can be either a select query or an action query.

A select query is a query for retrieving data, while an action query requests additional action to be performed on the data, like deletion, insertion and updating.

10. Database server

Database server is a server which uses a database application that provides database services to other computer programs or to computers, as defined by client-server model. (Thakur Dinesh. February 03, 2018).

1.2.4 Data modeling

1. Attributes

Attributes is refers to a database component, such as table. It also may refers to a database field. Attributes describe the instance in the column of a database.

2. Foreign key

A foreign key is a field (or collection of fields) in one table that refers to the primary key in another table.

The table containing the foreign key is called the child table, and the table containing the candidate key is called the referenced or parent table.

3. Database Relations

Database relation is sometimes used to refer to a table in a relational database but is more commonly used to describe the relationship that can be created between those tables in a relational database. (*Chen Peter, "Database Relations", March 1976*)

4. Entity

An entity is an on object that exists. It doesn't have to do anything; it just has to exit. In database administrator. Entity can be a single thing, person, place, or subject. Data can be stored about such entities. A design tool that allows database administrator to view the relationship between several entities is called the entity relationship diagram (ERD). (*Martin Gibb, "The Entity relation definition", 2016*)

5. Cardinality

The cardinality is all about how may distinct values are in the column, when applied to databases, the meaning is a bit different: it's the number of distinct values in a table column, relative to the number of rows in the table.

1.3 THEORETICAL REVIEW

The purpose of this part is to concretely examine the corpus of theory that has accumulated in regard to an issue, concept, theory, phenomena. The theoretical literature review help establish what theories already exist, the relationships between them, to what degree the existing theories have been investigated, and to develop new hypotheses to be tested. Often this form is used to help establish a lack of appropriate theories or reveal that current theories are inadequate for explaining new or emerging research problems. The unit of analysis can focus on a theoretical concept or a whole theory or framework. *(Bernardes, E.S. and Hanna, M.D., 2009. A theoretical review of flexibility, agility and responsiveness in the operations management literature: Toward a conceptual definition of customer responsiveness. International Journal of Operations & Production Management, 29(1), pp.30-53.)*

Our project entitled "**Bank Customers Management System**" is developed for helping bank to manage in good position their customers and it covers some of objectives such as:

- **Providing printed Reports and Slips**

The future system will provide all available provided services reports, all transaction (Deposit, Withdrawal, Loan and Repayment) slips and all available saved communications.

- **To record automatically Informations**

The future system will help the IMARA Cooperative of Savings and Credits to record in security and efficiency all customers informations; it will perform all transactions (Deposits, Withdrawals, Loans and Repayment) and save all transaction entered informations; it'll save all communications.

- **To create a database which will store all informations**

With future system, we will create the database in which will be stored all provided customers informations, to store all transaction processes and to store all communications.

- **To have efficiency communication with customers**

The future system will help the IMARA Cooperative of Savings and Credits to be in closer communication with their customers by sharing all provided services informations with the customers.

- **To describe and print the customers list.**

The future system will provide and print the list of all available customers in the system.

1.4 REVIEW OF RELATED LITERATURE

This part discusses past empirical investigations similar to or related to the current study. This part identifies as well the gaps existing in literature and specifies the ones that the research will focus on.

During our work we discover some existing studies similar and related to ours such as:

1. **Ebubeogu Amarachukwu Felix, E.A., 2015. *Bank Customers Management System*. From Kuala Lumpur Metropolitan University College.**

The purpose of this project was in partial fulfillment of the requirements of Bachelor's degree of Science in Information Technology.

- **Problem statement**

At present most of the banking applications are yet to overcome the rapidly growing attacks on their customer private data. Issues suck fraud operating within a conventional environment.

- **Objectives**

The objective of this project is to develop a bank customer management system to the best satisfaction of the customer and for profit maximization to the Banks.

The objectives are:

- To create a banking system that is easily via internet;

- Reduce the flow of human traffic and long queues at banks;
- Reduce the time wasted in going to banks to update personal details;
- To develop a bank customer management system with a multi-level security measure that will restore the customers' confidence.

- **Findings**

The major finding of this study is that customers of all bank groups are interested in e-banking services that provides a better customers management approach, but at the same time they are facing problems like, inadequate knowledge, poor network, lack of infrastructure, this Project frames some strategies like :

- Customer education;
- Seminars or meetings;
- Proper approach to manage existing customers;
- Create room for new customers.

When doing the analysis of this project we realize that it contains some failures and limitations such as:

- The lack of printing the transactions slips and services reports;
- The lack of the service feedback communications;
- The lack of the clear customers management;
- The lack of the account management.

Now we designed and developed a future system called "**BANK CUSTOMERS MANAGEMENT SYSTEM**".

Our project took place in order to develop, to improve and to implement the good performance of managing customers in a bank, to perform bank transactions in quick speed and to have a big interaction between a bank and customers effectively and with efficiency

Thereafter, facing all those limitation we have been motivated to design and develop the future project which will cover or handle all those limitations.

Comparing to this project, our project will:

- Provide the printed services reports and the transactions slips;
- Provide to customers the service feedback communications;
- To manage and protect customers private informations;
- To manage all necessary account details.

2. "*Bank Management System*", Dr. N. Ashok Kumar, Dr.M.Kannan, S.R. Sudharsana Raghavan, K.Giridharan, Assistant Professor, Department of Electrical & Electronics Engineering, SCSVMV University, Enathur, Kanchipuram, INDIA.

- **Problem statement**

At present high speed internets are available at cheaper rates broadband connection is cheap and it makes data transfer ease and quick. Expertise has developed as software solutions in the areas of bookkeeping and administration system of all banks.

- **Objectives**

The objectives of this project are:

- **NRI Banking Services**: Much benefit has been reaped in NRI(Non-Resident Indian) sectors particularly in fund transfers. Technology has made the life simple for NRI residents.
- **RURAL Banking**: Now bank has decentralized policies they expand not only in urban areas but also in rural areas. In India rural banking has taking an edge, particularly with mobile banking. Rural populations have gained a lot by these software solutions.
- **Remote banking**: ATMs have been installed throughout the country. These services not only act as money vending machines, but also provide multiple services like money deposit machines, fund transfers machines etc.
- **Core banking**: Since everything is centralized. Solutions are quick and fast. Anybody can bank from any place.
- **Mobile banking**: These are playing tremendous role in making banking services more friendly and swiftly.

- **Findings**

The modules such as:

- Manager account creation;
- Amount withdrawal transaction making;
- Deposits transaction making;
- Printing services reports.

Have been deployed to develop this project.

When doing the analysis of this project we realize that it contains some failures and limitations such as:

- The lack of printing the transactions slips;

- The lack of the service feedback communications;
- The lack of the clear customers management;
- The lack of the Loan and Repayment transaction making.

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- Provide to customers the service feedback communications;
- To manage and protect customers private informations.

3. "*E- Banking System in Pakistan*", Muhammad Rahimuddin Syed Asif Abbas Bukhari , School of Management, Blekinge Institute of Technology, Ronneby, Sweden Thesis for the Master's degree in Business Administration Spring, 2010.

The purpose of this thesis is to research and implementation of electronic banking and to observe how banks are carrying towards on this advance system in Pakistan.

- **Problem statement**

The study about e-banking adaptation has gained special attention during the last decade as for instance.

There were a lot of grievances over the delays in traditional banking services, withdrawals and delay in processing. Time is money but the customers have to wait for a long time of their turn in the bank for any banking facility. Sometime even from a remote area a customer has to travel to the concerned branch for any kind of transaction. On the closing hours it becomes more harmful if anyone want make a business deal for payment.

- **Objectives**

The purpose of this study is to establish the important that how the customers fond the concept and carry out e-banking services and to determine whether the utilization from the e-banking services, make more efficient, accurate and in time of banking services and also to make a variety and excellence between automated and a manual or ordinary Banking systems.

The specific objectives of this project are:

- The e- banking services open seven days a week and 24 hours a day.

- To decrease the cost-line and no need of physical bank branches
- To create more deep collection for consumer's needs and expectations.
- Terms of services to customers for their personal choices.
- Easy access for all.
- With the e-banking money can easily be get within no time from ATM machine.

- **Findings**

This project can use electronic funds transfer for:

- We can withdraw money by an ATM machine with a personal identification number (PIN), for our convenience, day or night. We can guide our bank or credit union to pay automatically monthly utility bills from our account, or our auto loan even our mortgage payment.
- We can buy food, fuel for our personal transport, and other goods at the purchasing point, using a credit card rather than cash.
- We can use a prepaid smart card embedded for our daily purchasing like pay phone, toll expenses, daily college expense or any bookstores.

When doing the analysis of this project we realize that it contains some failures and limitations such as:

- The lack of printing the transactions slips and services reports;
- The lack of the clear customers management;
- The lack of the account management.

Now we designed and developed a future system called "**BANK CUSTOMERS MANAGEMENT SYSTEM**".

Our project took place in order to develop, to improve and to implement the good performance of managing customers in a bank, to perform bank transactions in quick speed and to have a big interaction between a bank and customers effectively and with efficiency

Thereafter, facing all those limitation we have been motivated to design and develop the future project which will cover or handle all those limitations.

Comparing to this project, our project will:

- Provide the printed services reports and the transactions slips;
- Provide to customers the service feedback communications;
- To manage and protect customers private informations;
- To manage all necessary account details.

1.5. CONCEPTUAL FRAMEWORK

A conceptual framework includes one or more formal theories (in part or whole) as well as other concepts and empirical findings from the literature. It is used to show relationships among these ideas and how they relate to the research study.

During the work we mentioned some concepts which interact with our project such as:

- **Design**

The design concept was included in our project cause according to new technology environment when making clear and concise our project we need to design it.

- **Implementation**

The implementation concept is important in our project because after designing and developing our project we need to implement it in order to be sure if the system responds to all necessary bank needs.

- **Bank**

The bank in our project is a major concept cause is a prior field or domain in which our project will work.

- **Bank customers**

The bank customers' concept in our project is primordial beneficiary of our project which will manage their private information.

- **Management**

The management concept in our project is a major key word which our project will deal with; our project will be dealing with the management of bank customers.b

- **Report**

Report concept in our project is or represents all available printed service reports that our system will provide in bank area.

- **System**

This concept affects directly our project because it's the representation of the entire project which is the bank management system.

- **Desktop Application**

The desktop application concept it refers to our project because our project will be the system which runs on the desktop computer or devices using specially the Windows OS.

CHAPTER 2. METHODOLOGIES AND TECHNIQUES

2.0 INTRODUCTION

This chapter covers the methods, techniques and approaches used during our project development in order to obtain concerned datas and informations from field.

A methodology is known as a system of practices, techniques, procedures, and rules used by those who work in a discipline. *(Dinnie Muslihat, March 9, 2018 "Popular Project Management Methodologies")*

They are essentially processes that aim to assist project managers with guidance throughout the project, and the steps to take to completing the tasks. Different methodologies have different strategies that aid in managing issues should they arise during the project's delivery.

To complete such scientific work is not hazardous. It's the result from the research methodology and the chosen techniques.

2.1 TECHNIQUES

Techniques are any systematic ways of obtaining information about a scientific nature or to obtain a desired material or product.

In order to collect data, we have used interview, observation and documentation techniques.

1. Techniques of interview

The interview technique consists to organize a conversation in which the investigator asks questions to the surveyed person in order to elicit information.

Interviews are a part of the hiring process as it gives an in-depth impression of the applicant to the interviewer. It is vital to get the most out of an interview with the help of suitable questions and active listening to gauge the mood and behavioral pattern of the candidate.

Interviewing is a popular way of gathering qualitative research data because it is perceived as "talking," and talking is natural. This column discusses the type of interview most often used in educational evaluation: the semi-structured interview. A semi-structured interview means questions are predetermined, but the interviewer is free to ask for clarification. During an interview evaluation, the following issues and decisions need to be addressed: Decide who to interview, choose when to stop a particular interview, Select a place for the interview, Decide which questions to ask, and consider how the data will be collected. (*Griffee, D.T., 2005. Research Tips: Interview Data Collection. Journal of Developmental Education, 28(3), pp.36-37)*

Different scholars have defined 'interview' differently. According to *Scott* and others, "an interview is a purposeful exchange of ideas, the answering of questions and communication between two or more persons". Bingham and others define an interview as a 'conversation with a purpose".

Objectives of Interview:

In the selection process, interview serves the following objectives:

1. Verifies the information obtained through application form and tests.
2. Help obtain additional information from the applicant otherwise not available.
3. Gives the candidate necessary fact and information about the job and the organization.
4. Helps establish mutual understanding between the company and the candidate and build the company's images.

As this technique is based on the communication between the interviewer and the interviewee, we have used it to allow us to ask many questions regarding to our study to different customers and the bank director.

2. Technique of documentation

In order to conduct our research, documentation technique has been used for consulting a wide variety of documents such as different books in the library, website to read some online courses.

3. Techniques of observation

Observation is a technique that involves systematically selecting, watching, listening, reading, touching, and recording behavior and characteristics of living beings, objects, or phenomena.

The researchers, adopting this method, attempt to understand behavior and societies by getting to know the persons involved and their values, rituals, symbols, beliefs, and emotions.

Use of observation as a measurement procedure, assigning numerals to human behavioral acts, is discussed.

Observation has important advantages which makes it best suited for certain kinds of studies, and some limitations which preclude its use in others. The central problems in the use of observation are:

- It effect the observer on the observed, which is usually not severe and can be minimized;
- Observer inference, which is a crucial strength and a crucial weakness;
- The unit of behavior to be used, which involves the molar-molecular problem.

The considerations in planning both unstructured and structured observation studies are discussed, including what to observe, how to record it, how to maximize validity and reliability,

and how to handle the relationship between the observer and the observed. Behavior is usually sampled using event sampling or time sampling. The technique qualifies as a scientific method of data collection when it is specially designed to answer a research question and is systematically planned and executed with proper controls.

2.2 METHOLOGIES

The data collection methodology can be define as the process of gathering and measuring information on targeted variables in an established system, which then enables one to answer relevant questions and evaluate outcomes. Data collection is a component of research in all fields of study including physical and social sciences, humanities, and business. (*Lescroël, A. L. ; Ballard, G.; Grémillet, D.; Authier, M.; Ainley, D. G. (2014). Descamps, Sébastien (ed.). "Antarctic Climate Change: Extreme Events Disrupt Plastic Phenotypic Response in Adélie Penguins").*

1. Software development methodology

In this step, we are going to use a SDLC which is the process used by the software industry to design, develop and test high quality software. The SDLC aims to produce high quality software that meets or exceeds customer expectations, reaches completion within times and cost estimates. The following figure is a graphical representation of the various stages of a typical SDLC

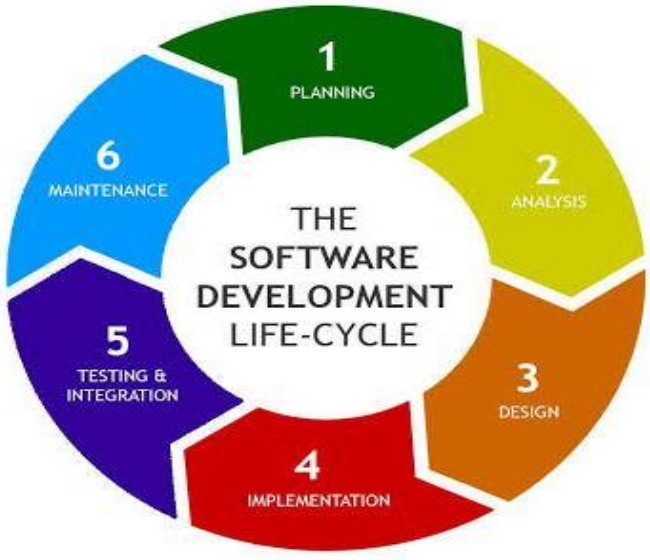


Figure 1 Sys

Source: *From medium.com*

Stage 1: Planning and Requirement Analysis

Requirement analysis is the most important and fundamental stage in SDLC it's performed by the senior members of the team with inputs from the customer, the sales department, market surveys and domain experts in the industry. The planning for the quality assurance requirements and identification of the risks associated with the project is also done in the planning stage.

Stage 2: Defining Requirements

Once the requirement analysis is done the next step is to clearly define and document the product requirements and get them approved from the customer or the market analysis. This is done through an SRS (Software Requirement Specification) document which consists of all the product requirements to be designed and developed during the project life cycle.

Stage 3: Designing the product Architecture

SRC is the reference for product architects to come out with the best architecture for the product to be developed.

Stage 4: Building or developing the product

In this stage of SDLC the actual development starts and the product is built. The developers must follow the coding guidelines defined by their organization and programming tools like compilers, interpreters, debuggers, etc. are used to generate the code.

Stage 5: Testing the product

This stage is usually a subset of all the stages as in the modern SDLC models, the testing activities are mostly involved in all the stages of SDLC.

Stage 6: Deployment in the Market and Maintenance

Once the product is tested and ready to be deployed it is released formally in the appropriate market.

CHOICE OF THE SDLC MODELS

There are various software development life cycle models defined and designed which are followed during the software development process but among them we have chosen to use the waterfall model for this project.

2. Waterfall model

Waterfall approach was the first SDLC model to be used widely in software engineering to ensure success of the project. In this model approach, the whole process of software development is decided into separate phases and the outcome of one phase acts as the input for the next phase sequentially.

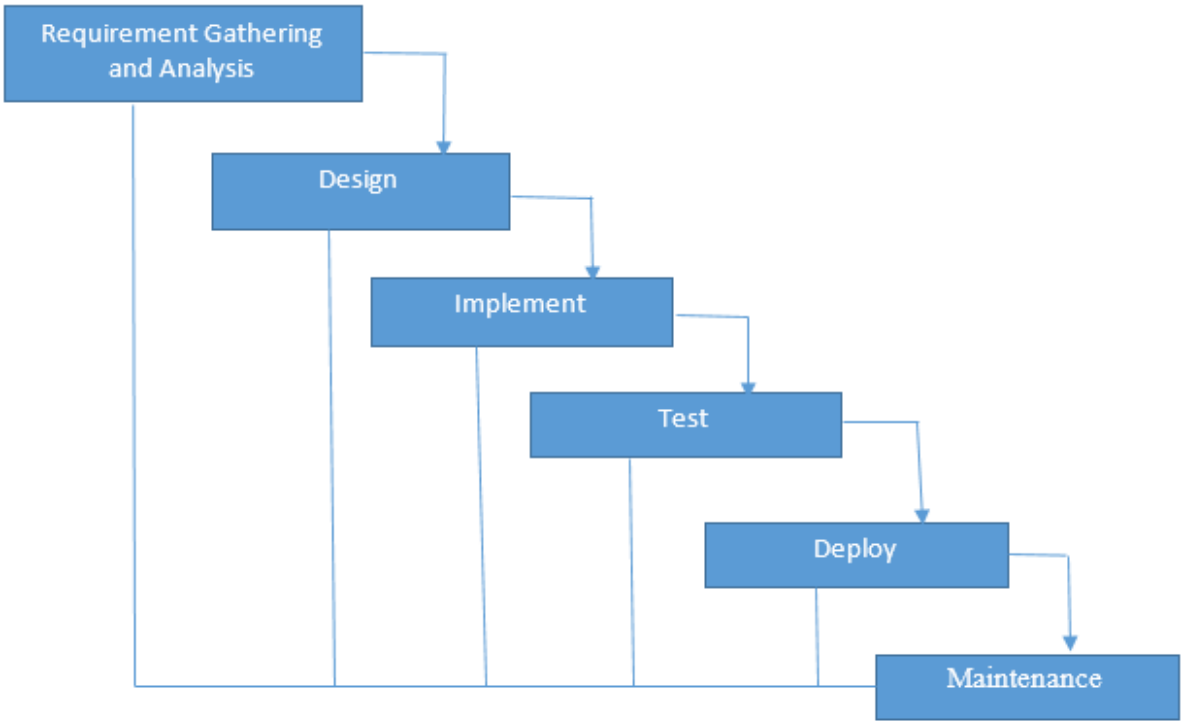


Figure 2 Waterfall model

Source: *From Tutorialspoint.com*

The sequential phases in Waterfall model are:

- ***Requirement Gathering and analysis***: All possible requirements of the system to be developed are captured in this phase and documented in a requirement specification document;
- ***System Design***: The requirement specifications from first phase are studied in this phase and the system design is prepared. This system design helps in specifying hardware and system requirements and helps in defining the overall system architecture;
- ***Implementation***: With inputs from the system design, the system is first developed in small programs called units, which are integrated in the next phase. Each unit is developed and tested for its functionality, which is referred to as Unit Testing;
- ***Integration and Testing***: All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures;

- ***Deployment of system***: Once the functional and non-functional testing is done; the product is deployed in the customer environment or released into the market;
- ***Maintenance***: There are some issues which come up in the client environment. To fix those issues, patches are released. Also, to enhance the product some better versions are released. Maintenance is done to deliver these changes in the customer environment.

Waterfall model advantages

- ✓ Simple and easy to understand and use;
- ✓ Easy to manage due to the rigidity of the model. Each phase has specific deliverables and a review process;
- ✓ Phases are processed and completed one at a time;
- ✓ Works well for smaller projects where requirements are very well understood;
- ✓ Clearly defined stages;
- ✓ Well understood milestones;
- ✓ Easy to arrange tasks;
- ✓ Process and results are well documented.

2.3 PROJECT SCHEDULE (GANTCHAT)

N0	Task	Start	End	Year 2020									
				Jan	*Feb*	*Mar*	*April*	*May*	*Jun*	*July*	*Aug*	*Sept*	*Oct*
01	System feasibility	10/January	30/Jan										
02	Requirements analysis and project planning	1/January	10/Feb										
03	System design	12/February	20/Apr										
04	System development	22/April	30/Aug										
05	System Test	1/September	30/Sept										
06	System Implementation	2/October	20/Oct										

Figure 3 Gantt Chart

Source: *Own drawing*

CHAPTER 3. SYSTEM ANALYSIS AND DESIGN

3.1 INTRODUCTION

In this chapter, the main objective is not only the design and structure of the bank customers management but also to analyze and describe deeply and concisely how the current project works. This chapter will cover and present also the problems caused by the current project and finally mentioned the proposed system working principle will be compared.

Firstly, before making any comment to the existing system, we first have to examine the current system so that may we identify problems and functionalities in order to facilitate us to develop the future system and to retrieve some errors in it to be corrected in the future system that provides acceptable and useful solutions concerning the bank customers management.

3.2 ANALYSIS OF THE CURRENT SYSTEM

3.2.1 Introduction

According our examination and analysis we got some errors in current system that must be solved in the future system and we've been able to propose some solutions that will be described in this phase.

After analyzing the existing bank customers management we realize that the registration reports were done manually because the system is not computerized. The current system took a lot of time to provide to the customer the deposit, the withdrawal, the loan and the repayment slips.

These are factors that cause the delay of the bank customer services because the current system doesn't provide communications with customer.

As customers of all bank are interested in banking services that provides a better customers management approach, but at the same they are facing problems like spending time while saving the Deposit, Withdrawal, Loan and Repayment slips which are done manually.

3.2.2 Problem of the current system

The following problems are problems identified in the current system after examination:

- The lack of the customer's private datas in the company.
- The speed problem of the transaction processes.
- Issues suck fraud operating within a conventional environment.
- Lack of adequate security measure is making it really challenging to successfully transform the bank customers;
- The lack communication between the bank and their customers;

- The current system spend a lot of times to provide Deposit, Withdrawal, Loan and Repayment Slip;
- There is no database for storing transaction Deposit, Withdrawal, Loan and Repayment Slip details.

3.3 ANALYSIS OF THE NEW SYSTEM

3.3.1 Introduction

In order to overcome the limitation and problems of the current system, this dissertation proposed to develop a computerized application named" Bank customers bank management". In the following, we are going to provide the current system and to describe how important will be differently to the current one.

The proposed system is computerized as the technology is advanced, to register customers the system save data in the database by inserting the personal details and applicants details and the bank account details.

To manage customers data the system provide de client details management in order to update and delete customers private informations. Therefore the customer will be able to make transactions (Deposit, Withdrawal, Loan and Repayment).

The future system is computerized as the technology is growing up and getting advanced very fast, everything needs to be updated in order to satisfy the needs of customers. That why we are going to design the proposed system which will solve all previous system problems such as to print Deposit, Withdrawal, Loan and Repayment slips faster than the previous.

Therefore the system will provide the customers all information in order to inform all possible bank movement, and system will be very helpful features and new services that are not in the current system.

3.3.2 Methodological approach

Methodology is a formal development process that defines a set of activities, methods, practices, deliverables and automated tools that are used by developers and projects managers to implement and maintain information systems.

1. Data collection techniques

To understand deeply the requirement and the problem domain, some techniques will help to achieve the aim of this dissertation. The three main techniques used are "Documentation", "Interview" and "Observation".

- ***Documentation technique***

This technique allows the researcher to consult books, memories, class notes and search some documents on internet that are related to his work.

- ***Interview***

In this research the interview technique has been used as data collection technique, it consisted of the conversation between the researcher and the person holding some key information.

- ***Observation***

Observation is a systematic data collection approach. Researchers use all of their senses to examine people in natural settings or naturally occurring situations.

2. Software Development Process Model

The development models are the various processes or methodologies that are being selected for the development of the project depending on the project's name objectives. Many development life cycles have been developed to allow people to reach different objectives. In this dissertation, the waterfall model has been preferred.

3.3.3 System requirements

The system requirement has two parts, functional requirement and non-functional requirement. The functional requirement is composed by what the system is intended to do while the non-functional requirement define how the system is supposed be.

1. Functional requirements

A **functional requirement** defines the basic system behavior. Essentially, they are what the system does or must not do, and can be thought of in terms of how the system responds to inputs. Functional requirements usually define if/then behaviors and include calculations, data input and business process.

Functional requirement are features that allow the system to function as it was intended. Put another way, if the functional requirements are not met, the system will not work. Functional requirement are product features and focus on use requirement.

The following are functional requirement of the future system:

- **System Administrator**

- The administrator will:
  - Register customer personal details, applicant details and bank account details;
  - Manage (View, Update, Delete) all customers details;

- View all available customers in the system;
- Make the customer transaction such as Deposit, Withdrawal, Loan and Repayment;
- Manage account details and check the customer account solde;
- Provide all possible Deposit, Withdrawal, Loan and Repayment slips;
- Provide all services report.

- **Customers (Clients)**

- The customer will:
  - Provide Personal details, Applicant details;
  - Data management request;
  - Transactions request.

2. Non-functional requirements

Non-functional requirements specify how the system should do. Non-functional requirement don't affect the basic functionality of the system (hence the name, non-functional requirements). Even if the non-functional requirements are not met, the system will still perform it basic purpose.

Non-functional requirement descriptions:

- The system shall be always available and accessed during working time.
- The system should work without any interruption; data should arrive on time respecting their integrity in order to allow the system and the administrator to take good decisions.
- The system speed and accuracy processing accuracy should be high so that the customers requests will be handled rapidly.
- The system should be easy to adapt and integrate in any bank customers services.
- The system should be available at any time and in any kind of environment except when working conditions are not respected.

If a system will still perform without meeting the non-functional requirements, why are they important? The answer is usability. Non-functional requirements define system behavior, features, and general characteristics that affect the user experience.

How well non-functional requirements are defined and executed determines how easy the system is to use, and is used to judge system performance. Non-functional requirements are product **properties** and focus on user **expectations.**

3.3.4 Design of the new system

In order to design the future system, we deal with the function diagram, context-diagram, Data Flow Diagram level 0, Level 1 and Level 2 and Entity Relationship Diagram. Here the structures of the described diagrams.

3.3.4.1 Function diagram

A function diagram in software engineering is a block diagram that describes the functions (Activities, Actions, Processes and Operations) and interrelations of a system.

1. DATAFLOW DIAGRAM

Data Flow Diagram is one the tools used in Software design representing a system at any level of detail with a graphic network showing Data flows, Data store, Data process and Data sources/destination.

- **Purpose and Objective of the Dataflow Diagram**

The purpose of data flow diagrams is to provide a semantic bridge between users and systems developers.

The goal of data flow diagramming is to have a commonly understood model of a system. The diagrams are the basis of structured systems analysis. Data flow diagrams are supported by other techniques of structured systems analysis such as data structure diagrams, data dictionaries.

a. Dataflow Diagram Symbols

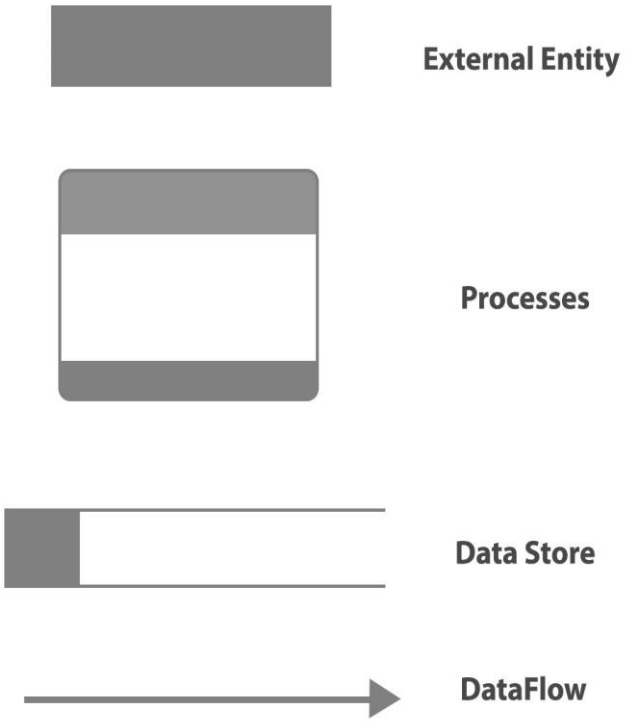


Figure 4 Da

Source: *Own drawing*

The DFD has basically 4 components which are:

- **The External Entity**: represents sources of data to the system or destinations of data from the system. They are objects outside the system, with which the system communicates. External entities are sources and destinations of the system's inputs and outputs.
- **The Data Flow**: symbol represents movement of data. They are pipelines through which packets of information flow. Label the arrows with the name of the data that moves through it.
- **The Data Store**: symbol represents data that is not moving (delayed data at rest). They are repositories of data in the system. They are sometimes also referred to as files.
- **The Process**: symbol represents an activity that transforms or manipulates the data (combines, reorders, converts, etc.). It transforms incoming data flow into outgoing data flow.

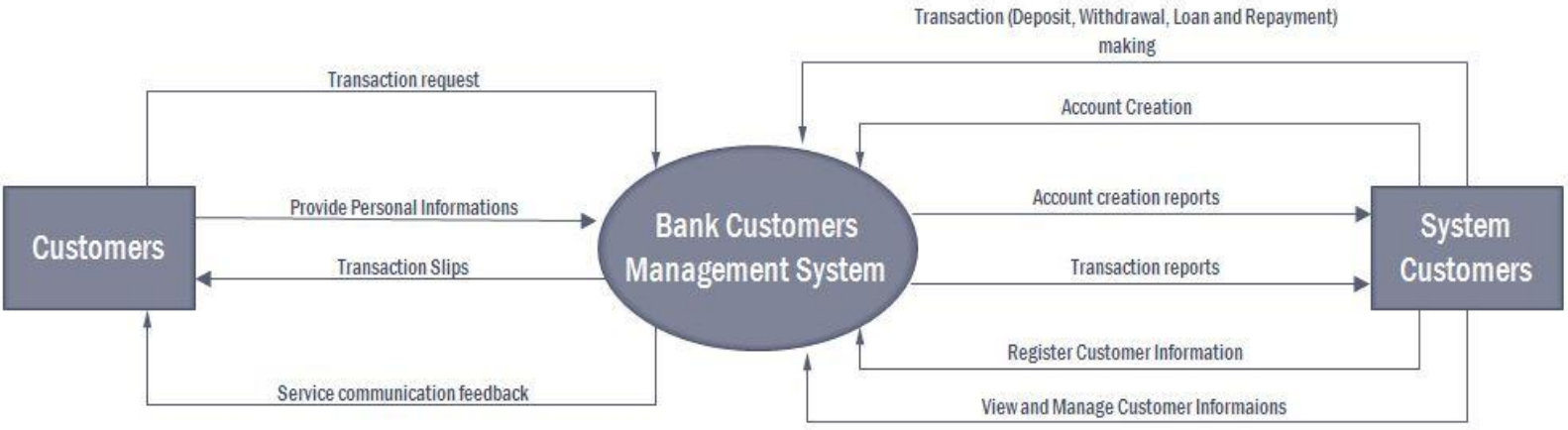


Figure 5 Data Flow Diagram (Context Diagram) Level 0

Source: *Own drawing*

In the figure above, the customer will firstly provide all necessary informations for the account creation then the system administrator will register customers information in the system, he or she will make the transactions (Deposit, Withdrawal, Loan and Repayment), the administrator can also view and manage (Update and Delete) customer informations. After that the system will deliver to the customers transactions slips and send to the customer services communication. The system will provide to the administrator the account creation and transactions printed reports.

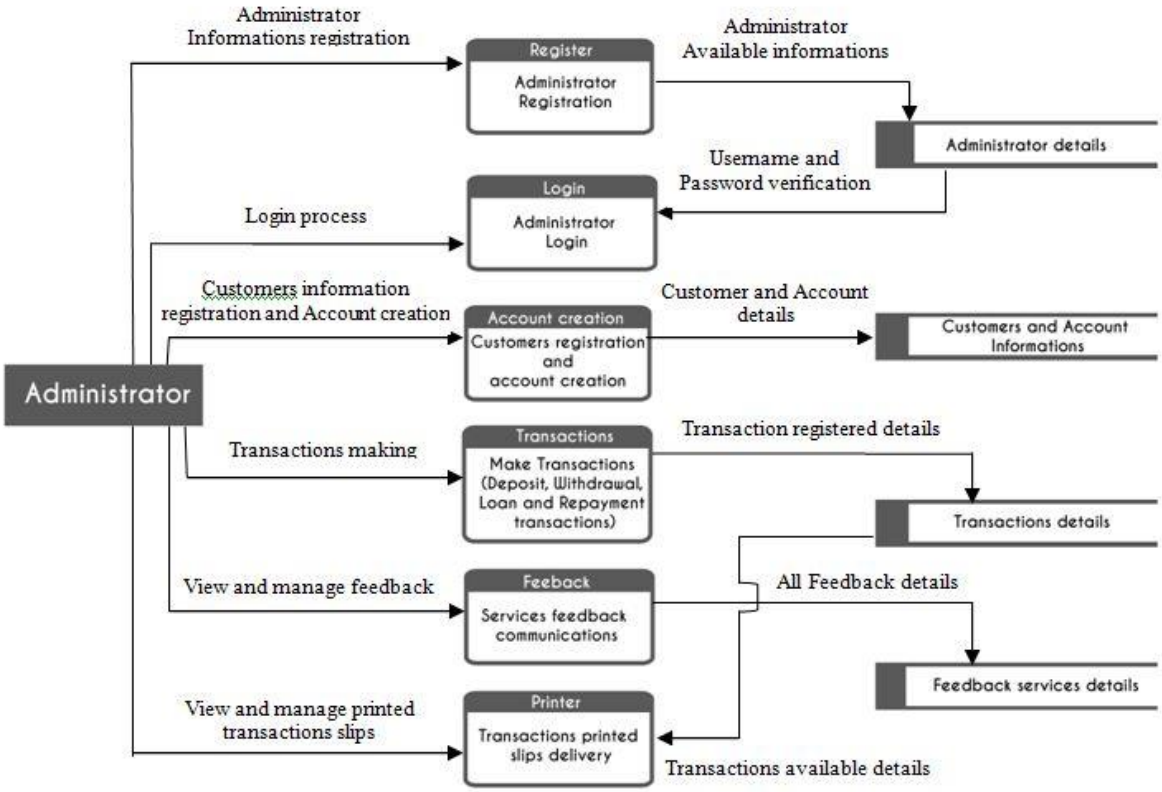


Figure 6 Data Flow Diagram (Context Diagram) Level 1 for Administrator in the Bank Customer Management System

Source: *Own drawing*

In this figure the system allow the administrator to register his personal details so that he may login the system, after login the system has to verify if the entered username and password are correct. The administrator registers the customer informations and creates the customer bank account which will be stored in the data store; the administrator can also make the customer transactions and store all transactions details, the system allows the administrator the manage and view the printed transactions slips, view and manage the feedbacks stored in the database.

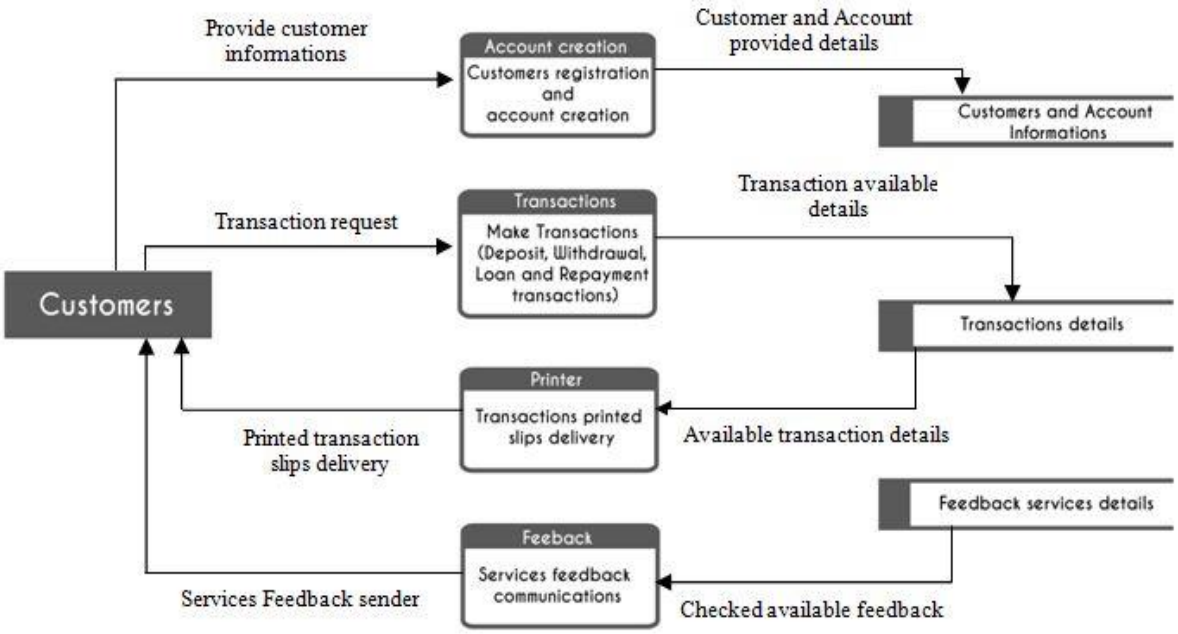


Figure 7 Data Flow Diagram (Context Diagram) Level 1 for Customer in the Bank Customer Management System

Source: *Own drawing*

In this system above, the customer provide personal, Applicant and the Account details which will be stored in the data store, the customer provide also the transaction requests stored in the data store.

The above system illustrate how the system will deliver to the customer the printed transactions (Deposit, Withdrawal, Loan and Repayment) slips; and how the customer will receive services feedbacks communications.

2. ENTITY RELATIONSHIP DIAGRAM

An Entity Relationship Diagram (ERD) is a visual representation of different entities within a system and how they relate to each other; they are widely used to design relational databases. The entities in the ER schema become tables, attributes and converted the database schema. Since they can be used to visualize database tables and their relationships it's commonly used for database troubleshooting as well.

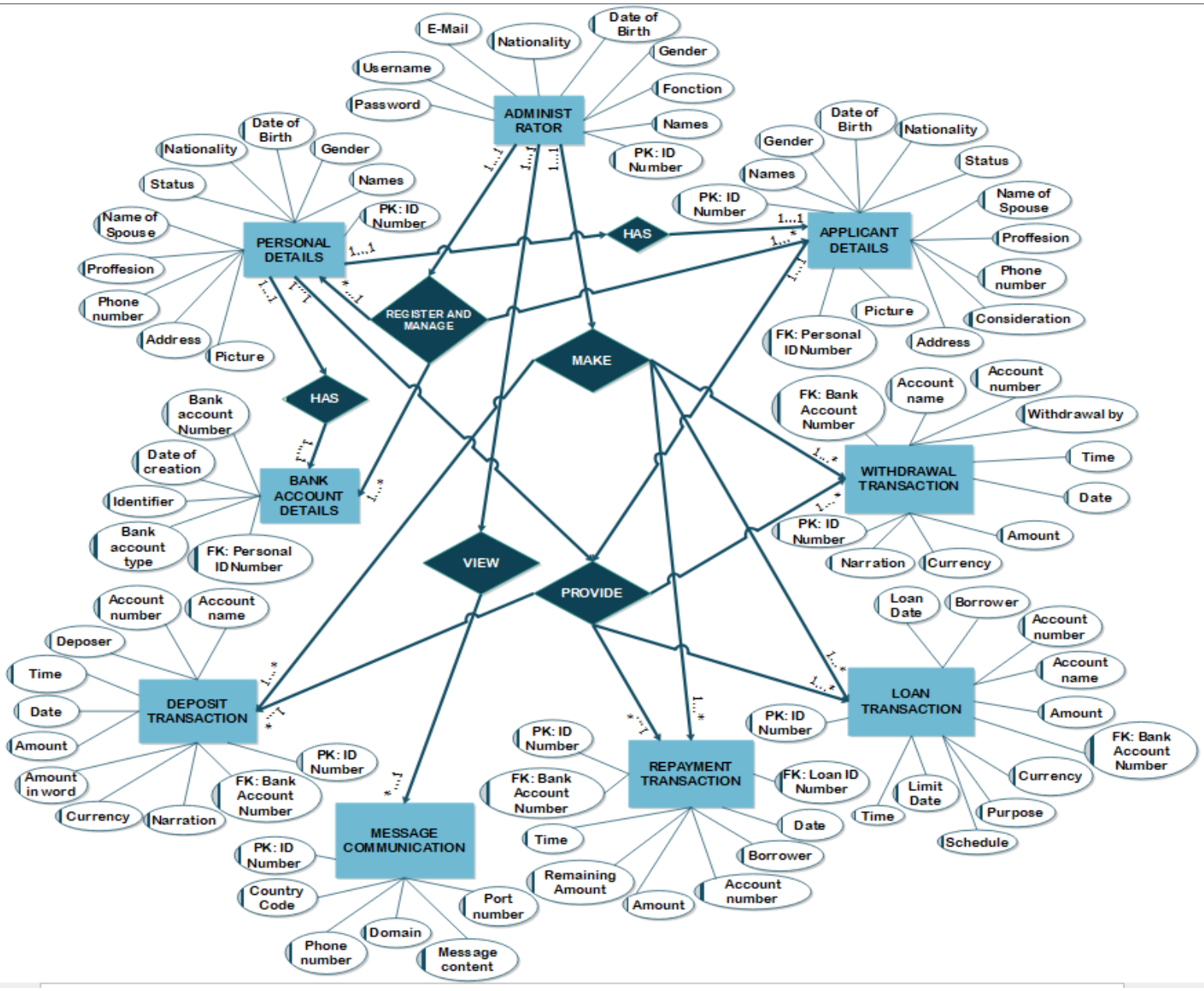


Figure 8 Entity Relationship Diagram

Source: *From EdrawMax*

In the Entity Relationship Diagram above, we realize that the system has basics entities such as Personal Details entity, Applicant Details entity, Bank Account Details entity, Deposit Transaction, Withdrawal Transaction, Loan Transaction, Repayment Transaction, Administrator Details, and Message Communications Details.

The system improve that all entities are related each other through a relationship, one customer Personal details can have one or many Applicant Details and each Customer Personal Details must have one Bank Account Details.

All Personals and Applicants are allowed to make one or many Deposit, Withdrawal, Loan and Repayment Transactions.

The administrator can manage one or many customer personal details.

Each customer or one customer can receive one or many Message communications.

3.3.4.2 Data dictionary (DD)

1. Definition:

Data Dictionary is an inventory data element in a database on data model with detailed descriptions of its format relationship, meaning, source and usage.

TABLE	Fields name	TYPE	SIZE	CONSTRAINT
Personal_Details	IDNumber	Int	10	Primary Key
	First_Name	Varchar	50	Not Null
	Second_Name	Varchar	50	Not Null
	Gender	Varchar	15	Not Null
	Date_of_Birth	NVarchar	50	Not Null
	Place_of_Birth	Varchar	50	Not Null
	Nationality	Varchar	50	Not Null
	Merital_Status	Varchar	50	Not Null
	Name_of_Spouse	Varchar	50	Not Null
	Proffesion	Varchar	50	Not Null
	Mobile_Number_Code	NVarchar	50	Not Null
	Mobile_Number	NVarchar	50	Not Null
	IDCard_Number	NVarchar	50	Not Null
	Country_Name	Varchar	50	Not Null
	Province	Varchar	50	Not Null
	Town	Varchar	50	Not Null
	Township	Varchar	50	Not Null
	Quarter	Varchar	50	Not Null
	Avenue	Varchar	50	Not Null
	House_Number	Int	10	Not Null
	Picture	Image	-	Not Null
Applicant_Details	IDNumber	Int	10	Primary Key
	Identifier	Varchar	50	Not Null
	First_Name	Varchar	50	Not Null

	Second_Name	Varchar	50	Not Null
	Gender	Varchar	15	Not Null
	Date_of_Birth	NVarchar	50	Not Null
	Place_of_Birth	Varchar	50	Not Null
	Nationality	Varchar	50	Not Null
	Merital_Status	Varchar	50	Not Null
	Name_of_Spouse	Varchar	50	Not Null
	Proffesion	Varchar	50	Not Null
	Mobile_Number_Code	NVarchar	50	Not Null
	Mobile_Number	NVarchar	50	Not Null
	IDCard_Number	NVarchar	50	Not Null
	Consideration	Varchar	50	Not Null
	Country_Name	Varchar	50	Not Null
	Province	Varchar	50	Not Null
	Town	Varchar	50	Not Null
	Township	Varchar	50	Not Null
	Quarter	Varchar	50	Not Null
	Avenue	Varchar	50	Not Null
	House_Number	Int	10	Not Null
	Picture	Image	-	Not Null
	Personal_ID_Number	Int	10	Foreign Key
Bank_Account_Bank	IDNumber	Int	10	Primary Key
	Bank_Account_Number	NVarchar	50	Not Null
	Date_of_Creation	NVarchar	50	Not Null
	Identify	Varchar	50	Not Null
	Bank_Account_Type	Varchar	50	Not Null
	Limit_Date	NVarchar	50	Not Null
	Personal_ID_Number	Int	10	Foreign Key
Deposit_Details	IDNumber	Int	10	Primary Key
	Account_Name	Varchar	50	Not Null
	Account_Number	NVarchar	50	Not Null
	Deposer_Name	Varchar	50	Not Null
	Transaction_Date	NVarchar	50	Not Null
	Transaction_Time	NVarchar	20	Not Null
	Amount	NVarchar	50	Not Null

	Amount_in_Words	Varchar	50	Not Null
	Currency	Varchar	20	Not Null
	Narration	Varchar	50	Not Null
	Bank_Account_ID_Number	Int	10	Foreign Key
Withdrawal_Details	IDNumber	Int	10	Primary Key
	Account_Name	Varchar	50	Not Null
	Account_Number	NVarchar	50	Not Null
	Withdrawal_by	Varchar	50	Not Null
	Transaction_Date	NVarchar	50	Not Null
	Transaction_Time	NVarchar	20	Not Null
	Amount	NVarchar	50	Not Null
	Amount_in_Words	Varchar	50	Not Null
	Currency	Varchar	20	Not Null
	Narration	Varchar	50	Not Null
	Bank_Account_ID_Number	Int	10	Foreign Key
Loan_Details	IDNumber	Int	10	Primary Key
	Loan_Date	NVarchar	50	Not Null
	Borrower	Varchar	50	Not Null
	Account_Number	NVarchar	50	Not Null
	Amount	NVarchar	50	Not Null
	Amount_in_Words	Varchar	50	Not Null
	Currency	Varchar	20	Not Null
	Purpose	Varchar	100	Not Null
	Schedule	NVarchar	50	Not Null
	Limit_Date	NVarchar	50	Not Null
	Transaction_Time	Nvarchar	20	Not Null
	Bank_Account_ID_Number	Int	10	Foreign Key
Repayment_Details	IDNumber	Int	10	Primary Key
	Loan_Date	NVarchar	50	Not Null
	Borrower	Varchar	50	Not Null
	Account_Number	NVarchar	50	Not Null
	Amount	NVarchar	50	Not Null
	Amount_in_Words	Varchar	50	Not Null
	Remaining_Amount	NVarchar	20	Not Null
	Transaction_Time	NVarchar	20	Not Null

	Loan_ID_Number	Int	10	Foreign Key
	Bank_Account_ID_Number	Int	10	Foreign Key
Administrator_Details	IDNumber	Int	10	Primary Key
	First_Name	Varchar	50	Not Null
	Second_Name	Varchar	50	Not Null
	Gender	Varchar	15	Not Null
	Date_of_Birth	NVarchar	50	Not Null
	Fonction	Varchar	50	Not Null
	Nationality	Varchar	50	Not Null
	E_Mail	NVarchar	50	Not Null
	User_Name	Varchar	50	Not Null
	Password	NVarchar	50	Not Null
	E_Mail	NVarchar	50	Not Null
	User_Name	Varchar	50	Not Null
	Password	NVarchar	50	Not Null
	E_Mail	NVarchar	50	Not Null
Message_Communication_Details	IDNumber	Int	10	Primary Key
	Account_Number	Int	50	Not Null
	Mobile_Number	NVarchar	50	Not Null
	Message	NVarchar	1000	Not Null

Table 1 DATA DICTIONARY (DD)

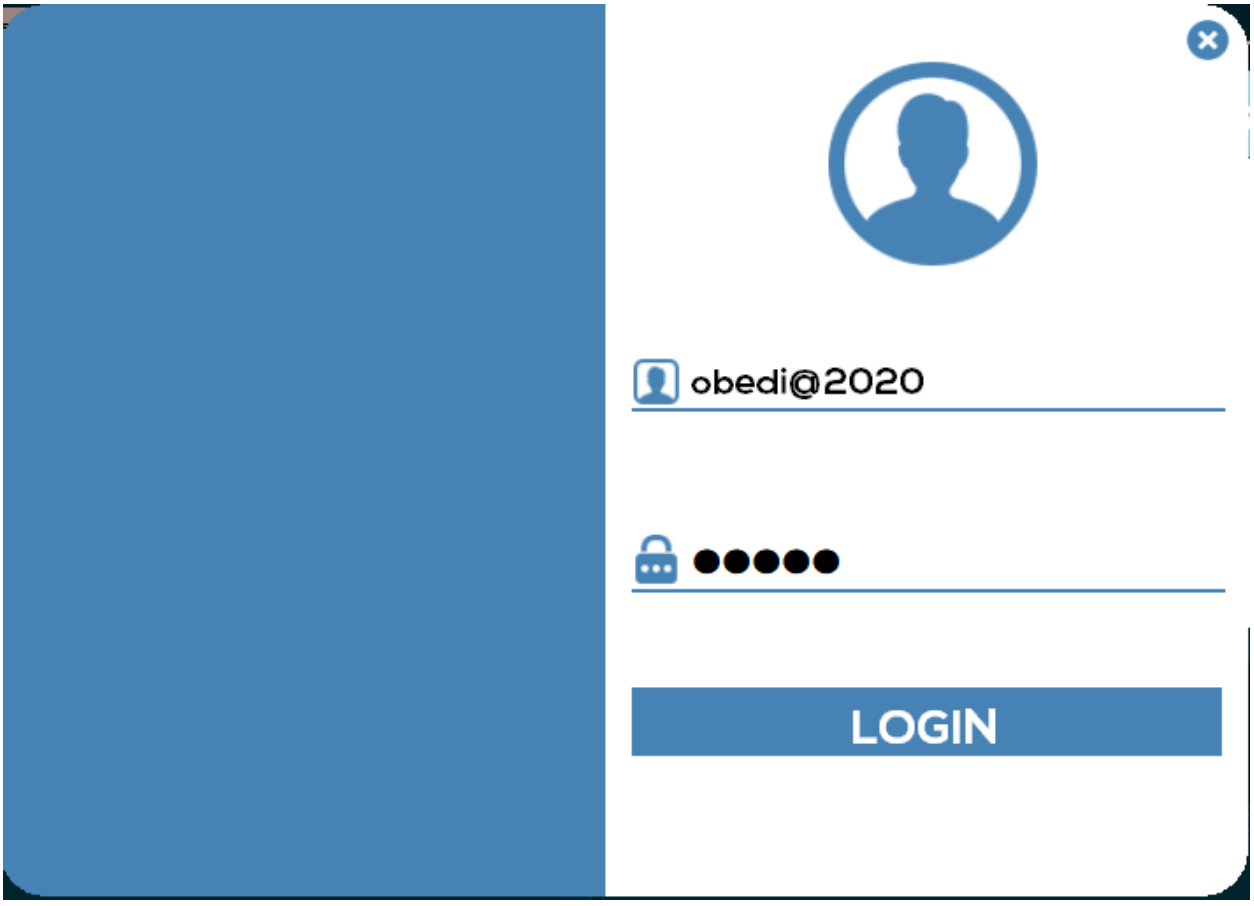
CHAPTER 4. SYSTEM IMPLEMENTATION

4.1 INTRODUCTION

This chapter is focused on the implementation of the new system; it describes the working application from print screens and show the major interactive or important part of the system and it define how the information system should be built, ensuring that the information system is operational and used, ensuring that the information system meets quality standard.

4.2 INTERFACES OF THE SYSTEM

Figure 9 Login interface

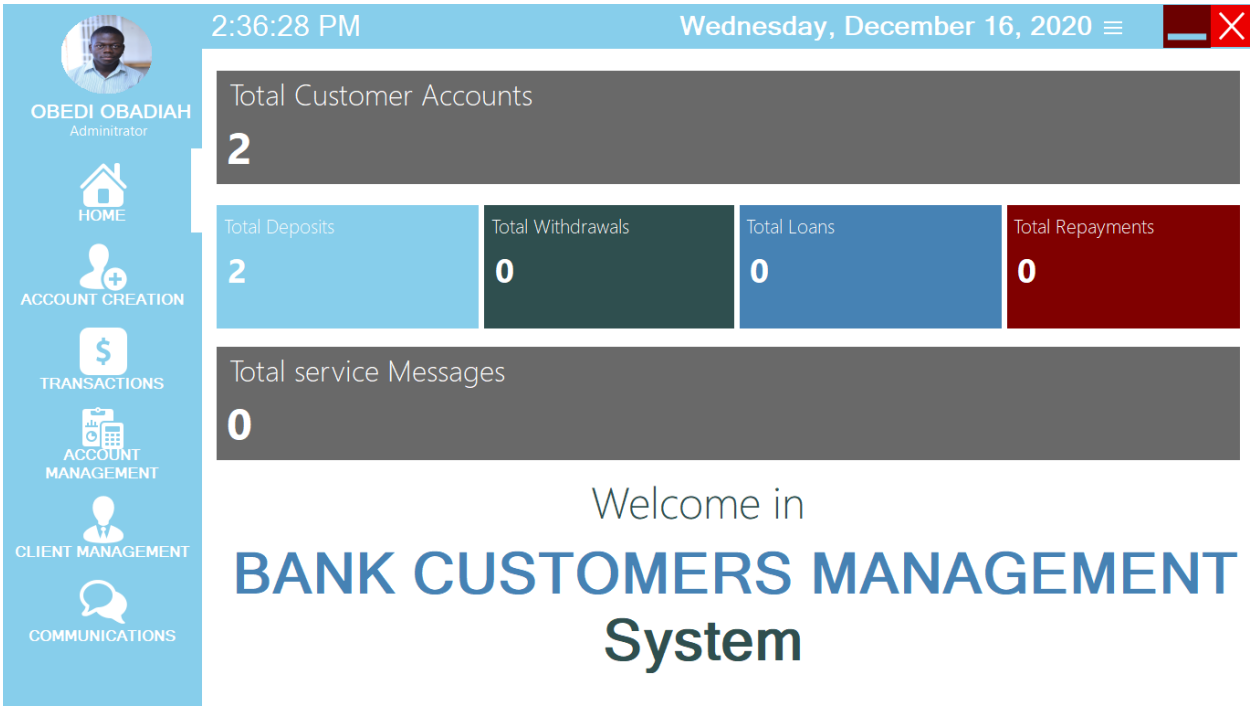


Source: *Own drawing*

This interface it is the first interface to appear once the system is lunched and it provide the login interface where users can login into the system. The user must be the admin.

Once the Admin is logged the system will redirect him to the main dashboard, where the Admin will find and enjoy all system functionalities.

Figure 10 Home Dashboard Interface



Source: *Own drawing*

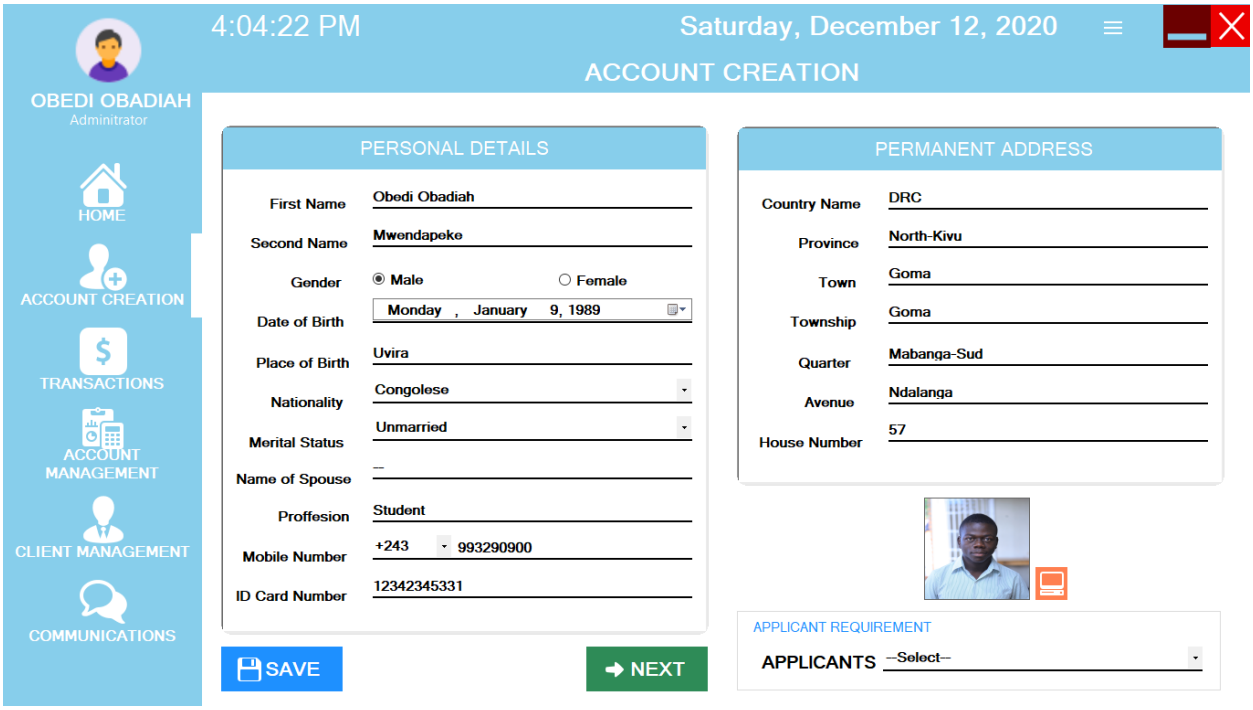
Once the Admin is successfully logged into the system, he or she can see this dashboard that provides different menu buttons such as:

- **Home** which is the dashboard or the home page of the system ;
- **Account Creation** for creating new customer account;
- **Transactions** for making transactions (Deposit, Withdrawal, Loan, Repayment);
- **Account Management** for managing all stored account in the system;
- **Client management** for managing all available customers informations stored in the system;
- **Communications** for the visualization of all service message communications.

In the home interface the Admin will find also:

- The total number of all customer accounts stored in the system;
- The total number of all deposit transactions stored in the system;
- The total number of all Withdrawal transactions stored in the system;
- The total number of all Loan transactions stored in the system;
- The total number of all Repayment transactions stored in the system;
- The total number of all Service message communications stored in the system;

Figure 11 Account Creation for Personal customer details Interface



Source: *Own drawing*

The admin is redirected to the Account Creation for Personal customer details interface by a simple clicking to the "***ACCOUNT CREATION***" button where the admin can register all personal customer informations.

These are personal customer informations to be register:

First Name, Second Name, Gender, Date of Birth, Place of Birth, Nationality, Merital Status, Name of spouse , Profession, Mobile Number Code, Mobile Number, ID Card Number, Country Name, Province, Town, Township, Quarter, Avenue, House Number, Picture.

Once all informations are filled then the Admin will press "***SAVE"*** button to register those informations.

Figure 12 Account Creation for Applicant details Interface

Source: *Own drawing*

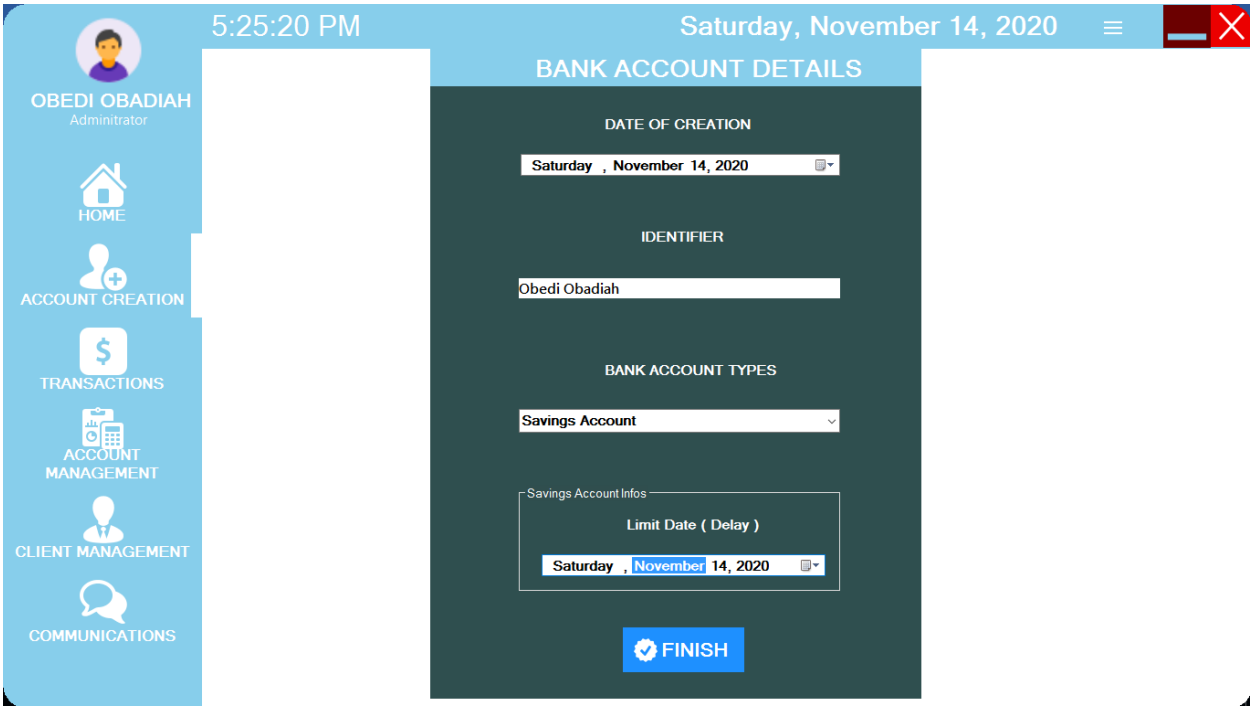
After registering Personal customer informations registered the admin is redirected to the Account Creation for Applicant details interface by a simple clicking to the "***NEXT***" button where the admin can register all Applicant customer informations.

These are Applicant informations to be register:

Identifier, First Name, Second Name, Gender, Date of Birth, Place of Birth, Nationality, Merital Status, Name of spouse , Profession, Mobile Number Code, Mobile Number, IDCard Number, Consideration, Country Name, Province, Town, Township, Quarter, Avenue, House Number, Picture.

Once all informations are filled then the Admin will press "***SAVE"*** button to register those informations.

Figure 13 Bank Account details Interface



Source: *Own drawing*

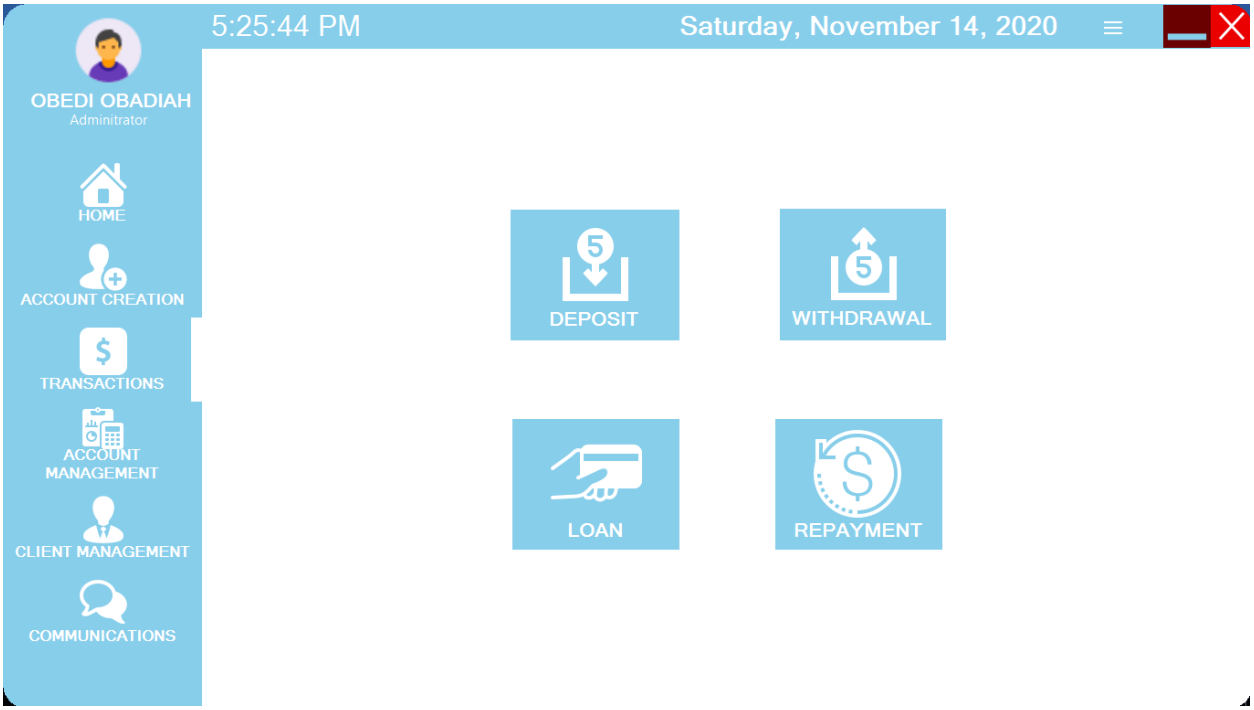
After registering Applicant information registered the admin is redirected to the Bank Account details interface by a simple clicking to the "***NEXT***" button where the admin can register all bank account details.

These are Bank account informations to be register are:

- Date of Creation;
- Identifier, which is the name of the account owner;
- Bank account types;
- Limit date(Delay) which appears only when the Bank Account type is the Saving Account;

Once all informations are filled then the Admin will press "***FINISH"*** button to register those informations.

Figure 14 Transaction menu interface



Source: *Own drawing*

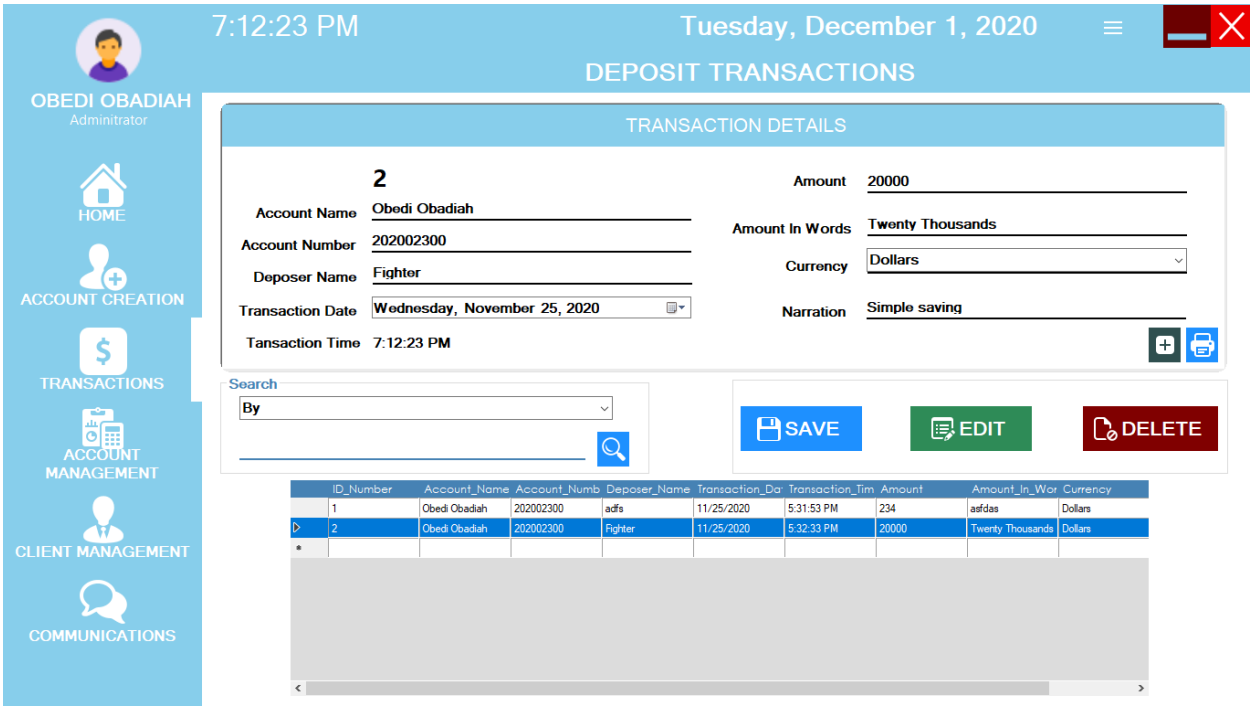
Once the Account creation is finish then the Admin will be redirected to Transaction menu interface by a simple clicking to the "***TRANSACTIONS***" button where he or she can find the menu of all available transactions in the system.

There are the available transactions in the system:

- Deposit transaction;
- Withdrawal transaction;
- Loan transaction;
- Repayment transaction.

Thereafter the Admin can choose which transaction he or she want to make.

Figure 15 Deposit transaction interface



Source: *Own drawing*

The admin is redirected to the Deposit transaction interface by a simple clicking to the "***DEPOSIT***" button where the admin can perform the customer transaction and manage Deposit transaction saved informations by editing and deleting; the Admin can also print the Deposit slips.

These are Deposit required information to be saved:

Account Name, Account Number, Deposer Name, Transaction Date, Transaction Time, Amount, Amount in Word, Currency, Narration.

Once all required informations are filled then the Admin will press "***SAVE"*** button to register those informations.

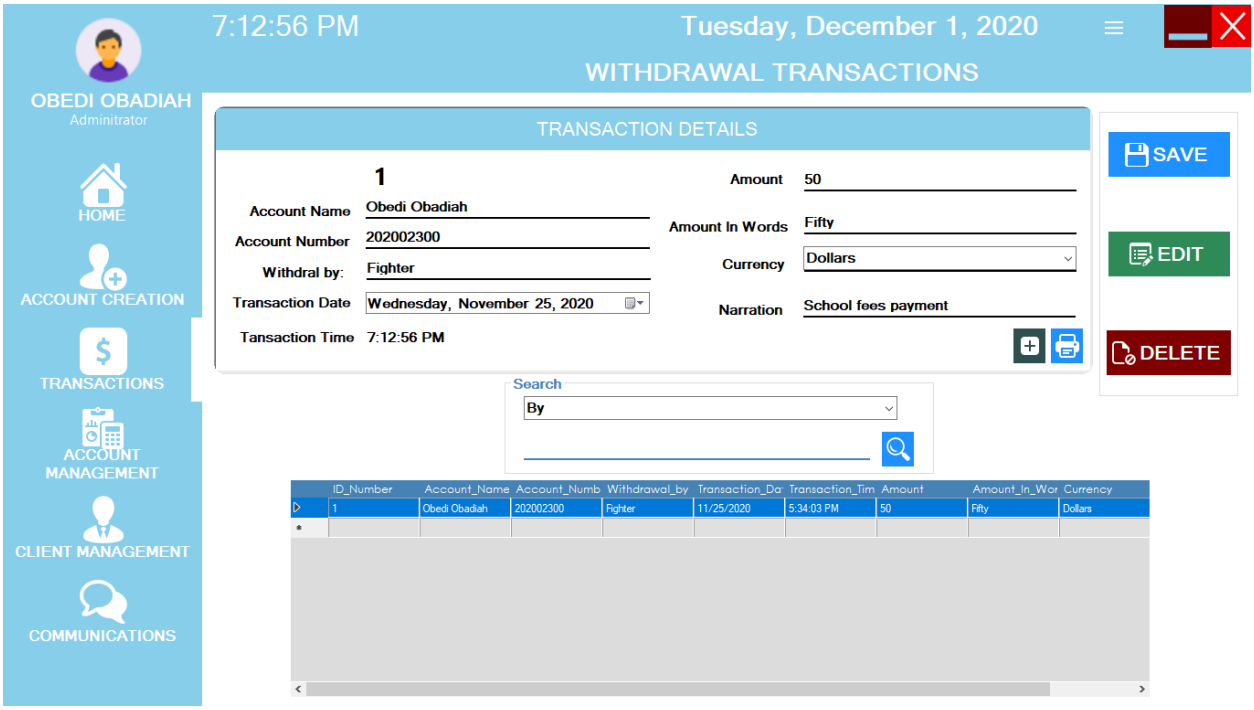
After registering deposit informations the Admin is allowed to make the search by writing either the account name or the account number and press "***SEARCH"*** button.

The Admin is also able to print the deposit slip by pressing to the "***PRINT***" button.

The Admin can press "***EDIT"*** button to edit customer saved informations.

The Admin can press "***DELETE"*** button to delete customer saved informations.

Figure 16 Withdrawal Transaction Interface



Source: *Own drawing*

The admin is redirected to the Withdrawal transaction interface by a simple clicking to the "***WITHDRAWAL***" button on the "***Transaction menu interface***", where the admin can perform the customer Withdrawal transaction and manage Withdrawal transaction saved informations by editing and deleting; the Admin can also print the Withdrawal slips.

These are Withdrawal required information to be saved:

Account Name, Account Number, Withdrawal By, Transaction Date, Transaction Time, Amount, Amount in Word, Currency, Narration.

Once all required informations are filled then the Admin will press "***SAVE"*** button to register those informations.

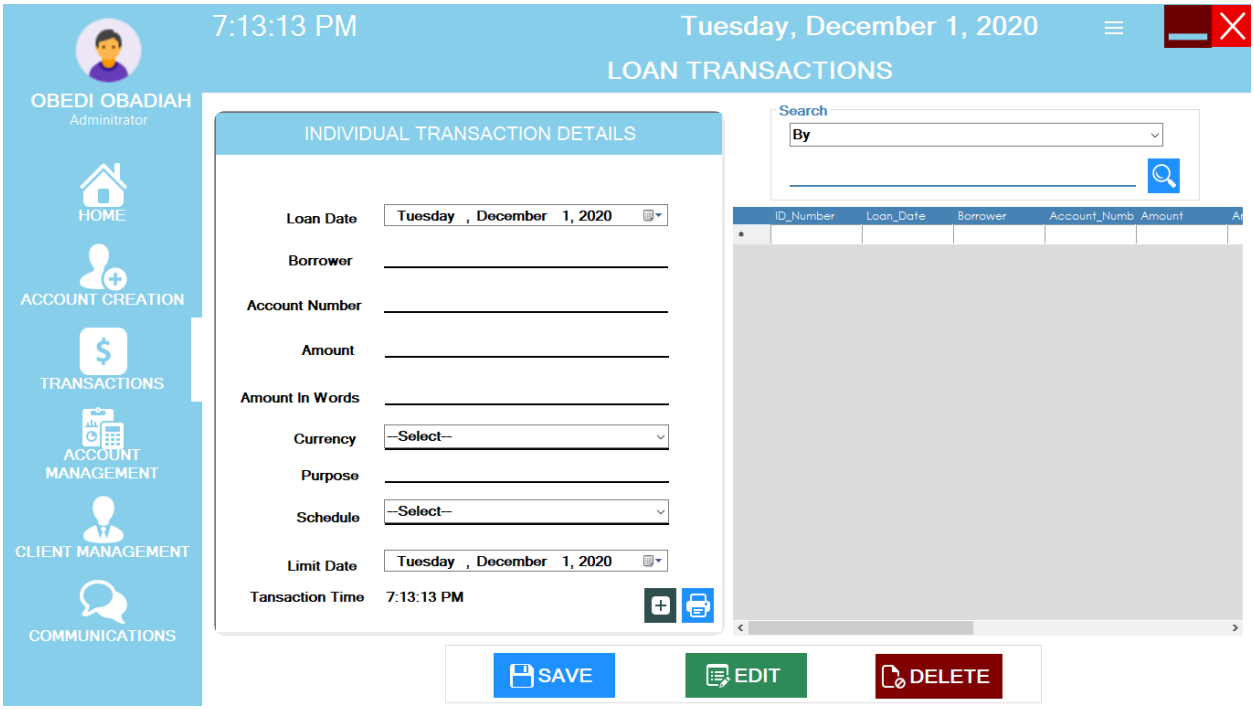
After registering withdrawal informations the Admin is allowed to make the search by writing either the account name or the account number and press "***SEARCH***" button.

The Admin is also able to print the withdrawal slip by pressing to the "***PRINT***" button.

The Admin can press "***EDIT"*** button to edit customer saved informations.

The Admin can press "***DELETE"*** button to delete customer saved informations.

Figure 17 Loan Transaction Interface



Source: *Own drawing*

The admin is redirected to the Loan transaction interface by a simple clicking to the "***LOAN***" button on the "***Transaction menu interface***", where the admin can perform the customer Loan transaction and manage Loan transaction saved informations by editing and deleting; the Admin can also print the Loan slips.

These are Loan required information to be saved:

Loan Date, Borrower, Account Number, Amount, Amount in Word, Currency, Purpose, Schedule, Limit Date, Transaction Time.

Once all required informations are filled then the Admin will press "***SAVE"*** button to register those informations.

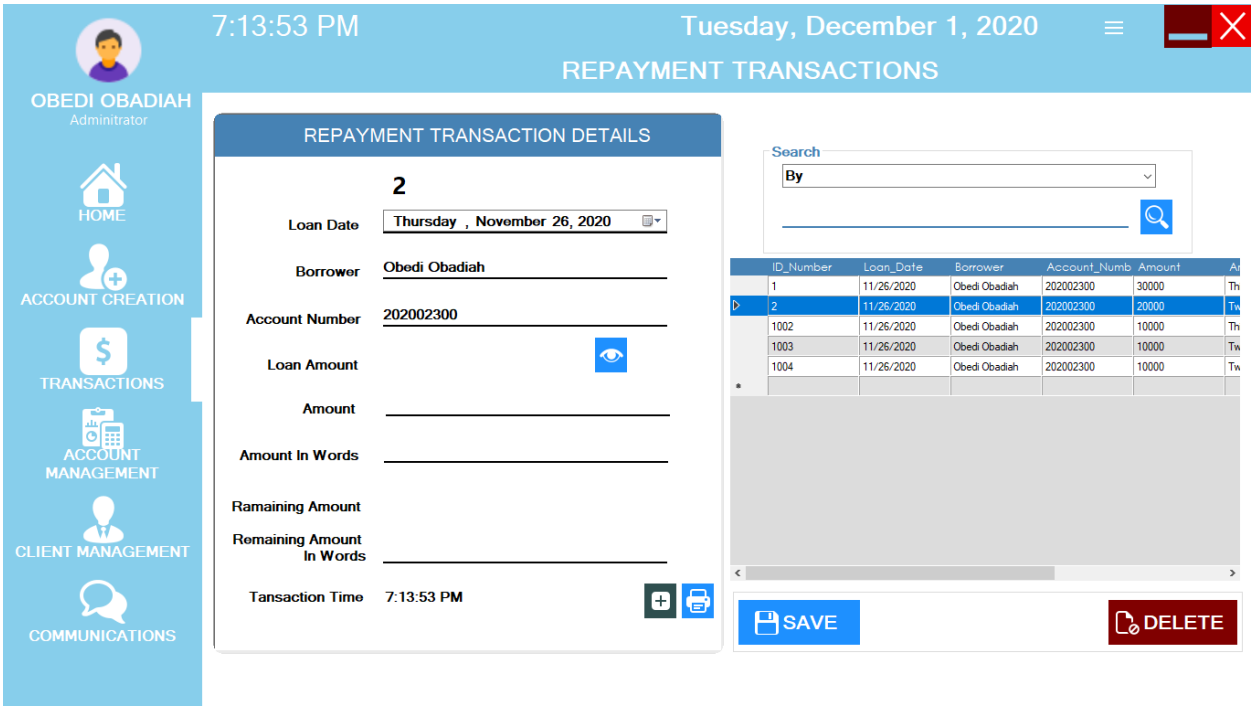
After registering loan informations the Admin is allowed to make the search by writing either the account name or the account number and press "***SEARCH"*** button.

The Admin is also able to print the loan slip by pressing to the "***PRINT***" button.

The Admin can press "***EDIT"*** button to edit customer saved informations.

The Admin can press "***DELETE"*** button to delete customer saved informations.

Figure 18 Repayment Transaction Interface



Source: *Own drawing*

The admin is redirected to the Repayment transaction interface by a simple clicking to the "***REPAYMENT***" button on the "***Transaction menu interface***", where the admin can perform the customer Repayment transaction and manage Repayment transaction saved informations by editing and deleting; the Admin can also print the Repayment slips.

These are Repayment required information to be saved:

- Loan Date, which is the date of the transaction;
- Borrower;
- Account Number;
- Amount;
- Amount in words;
- Remaining Amount, which is the remaining amount from the loan amount.

Once all required informations are filled then the Admin will press "***SAVE"*** button to register those informations.

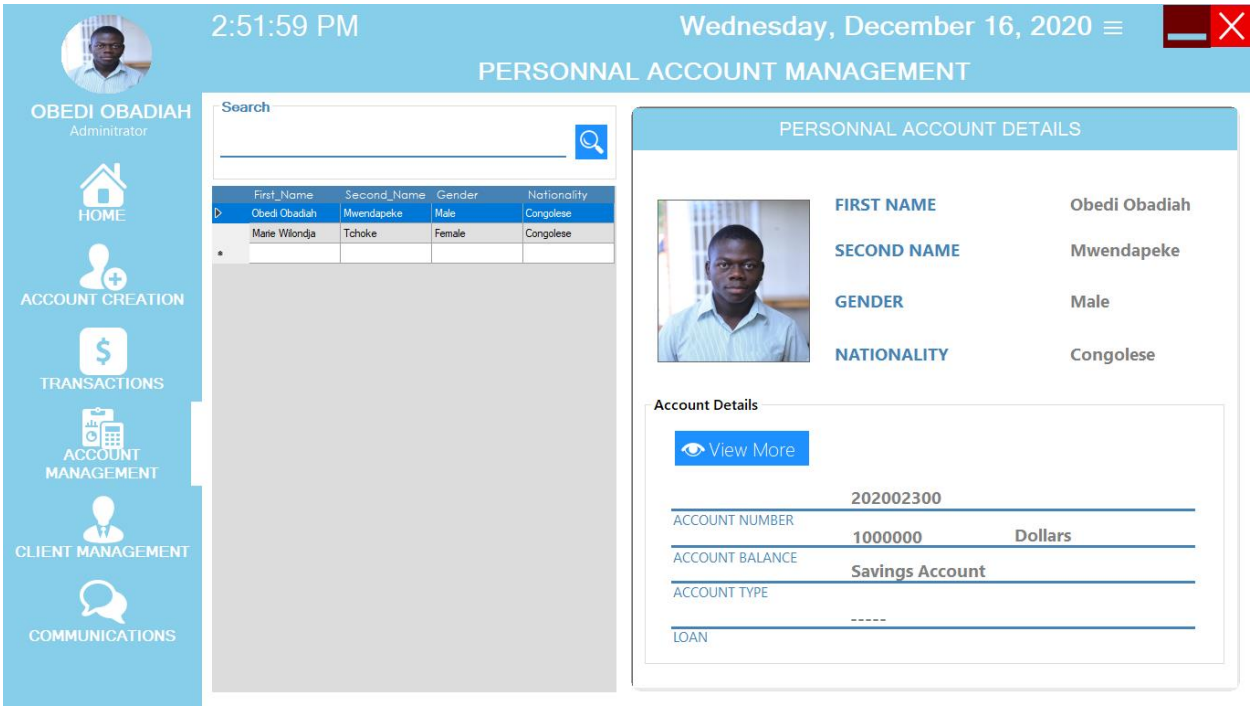
After registering repayment informations the Admin is allowed to make the search by writing either the account name or the account number and press "***SEARCH"*** button.

The Admin is also able to print the repayment slip by pressing to the "***PRINT***" button.

The Admin can press "***EDIT"*** button to edit customer saved informations.

The Admin can press "***DELETE"*** button to delete customer saved informations.

Figure 19 The Account Management Interface



Source: *Own drawing*

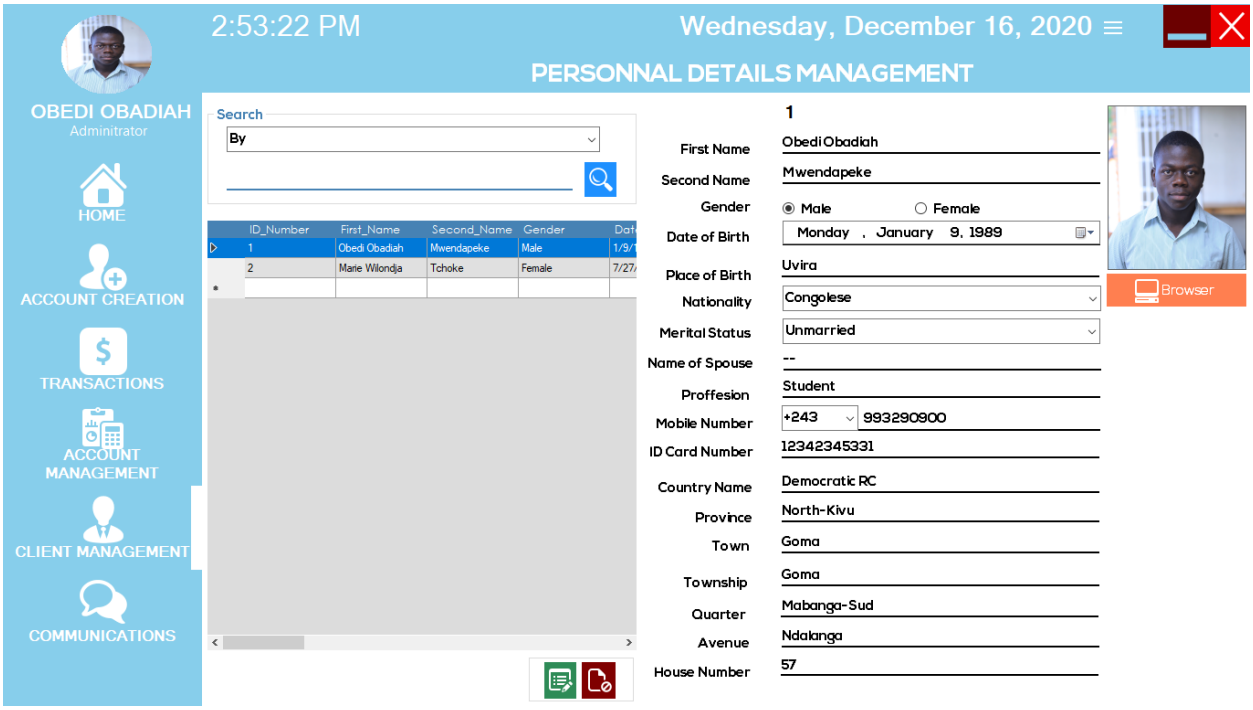
The admin is redirected to the Account Management Interface by a simple clicking to the "***ACCOUNT MANAGEMENT***" button where the admin can just view customer specified informations such as:

- ***Fist Name***, which is the first name of the customer;
- ***Second Name***, which is the second name of the customer;
- ***Gender***, which is the gender of the customer;
- ***Nationality***, which is nationality of the customer;
- ***Account Number***, which the customer account number;
- ***Account Balance***, which the customer account balance;
- ***Account Type***, which is the customer account type;
- ***Loan***, which is the customer available loan.

After viewing customers specified informations the Admin is allowed to make the search by writing either the account name or the account number and press to the "***SEARCH*"** button.

The Admin is also able to print all account given details by pressing to the "***PRINT***" button.

Figure 20 Personal Details Management Interface



Source: *Own drawing*

The admin is redirected to the Personal Details Management interface by a simple clicking to the "***PERSONAL DETAILS***" button on the "***Client Management Menu***", where the admin can manage the customer personal informations by editing and deleting.

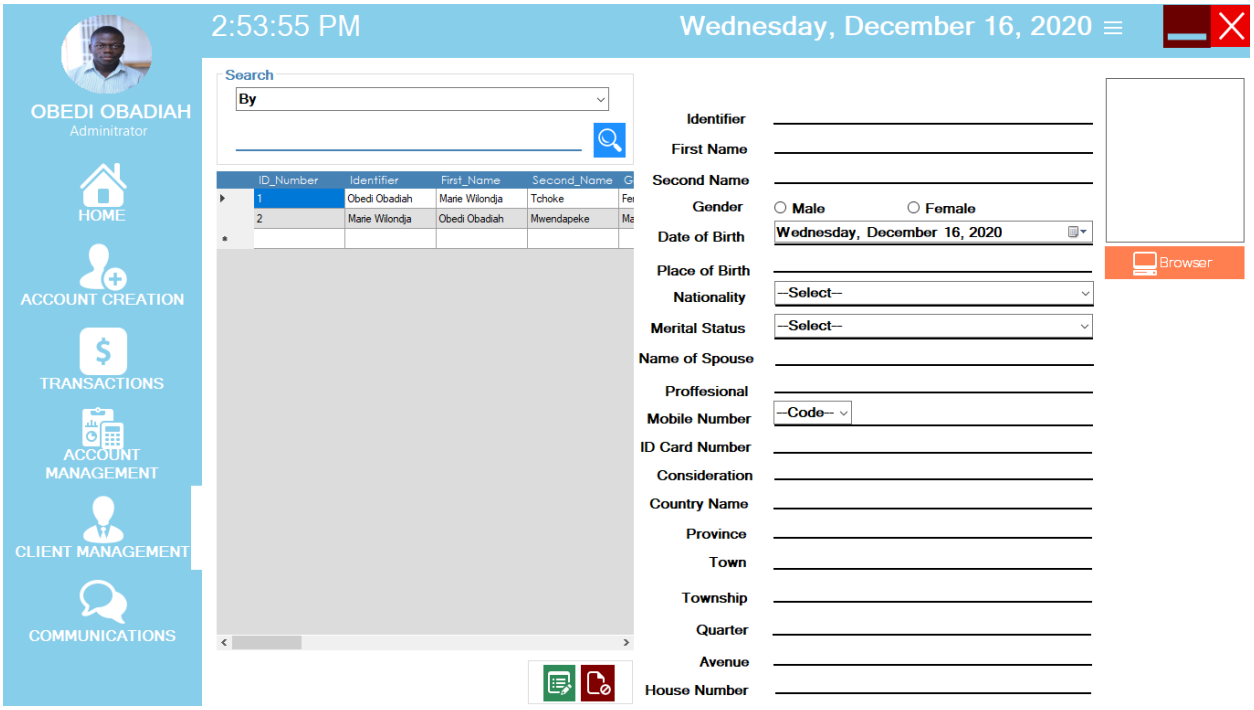
These are Personal Details information to be managed:

ID Number, First Name, Second Name, Gender, Date of Birth, Place of Birth, Nationality, Merital Status, Name of spouse , Profession, Mobile Number Code, Mobile Number, ID Card Number, Country Name, Province, Town, Township, Quarter, Avenue, House Number, Picture.

Once all required informations are filled then the Admin can press "***EDIT"*** button to edit customer saved informations.

The Admin can press "***DELETE"*** button to customer Personal Details saved informations.

Figure 21 Applicant Details Management Interface



Source: *Own drawing*

The admin is redirected to the Applicant Details Management interface by a simple clicking to the "***APPLICANT DETAILS***" button on the "***Client Management Menu***", where the admin can manage the customer applicant informations by editing and deleting.

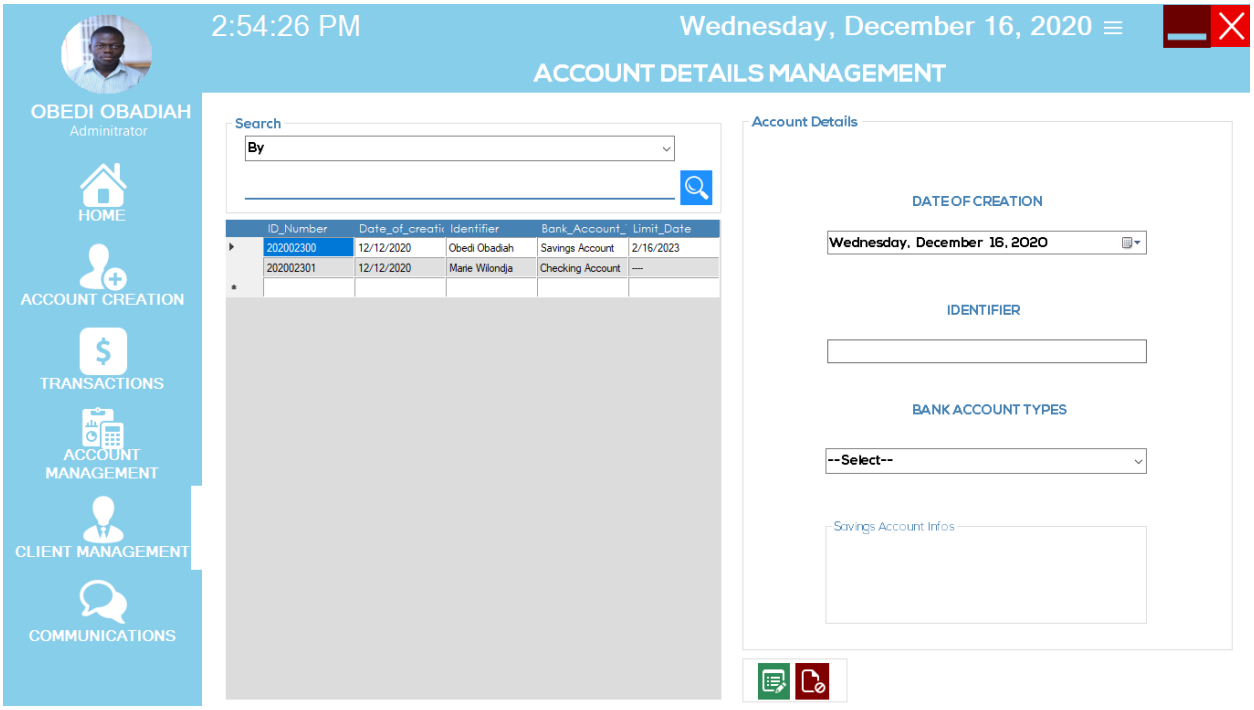
These are Applicant Details information to be managed:

Identifier, ID Number, First Name, Second Name, Gender, Date of Birth, Place of Birth, Nationality, Merital Status, Name of spouse , Profession, Mobile Number Code, Mobile Number, ID Card Number, Consideration, Country Name, Province, Town, Township, Quarter, Avenue, House Number, Picture.

Once all required informations are filled then the Admin can press "***EDIT"*** button to edit customer saved informations.

The Admin can press "***DELETE"*** button customer applicant saved informations.

Figure 22 Bank Account Management Interface



Source: *Own drawing*

The admin is redirected to the Bank Account Management interface by a simple clicking to the "***BANK ACCOUNT DETAILS***" button on the "***Client Management Menu***", where the admin can manage the customer Bank Account informations by editing and deleting.

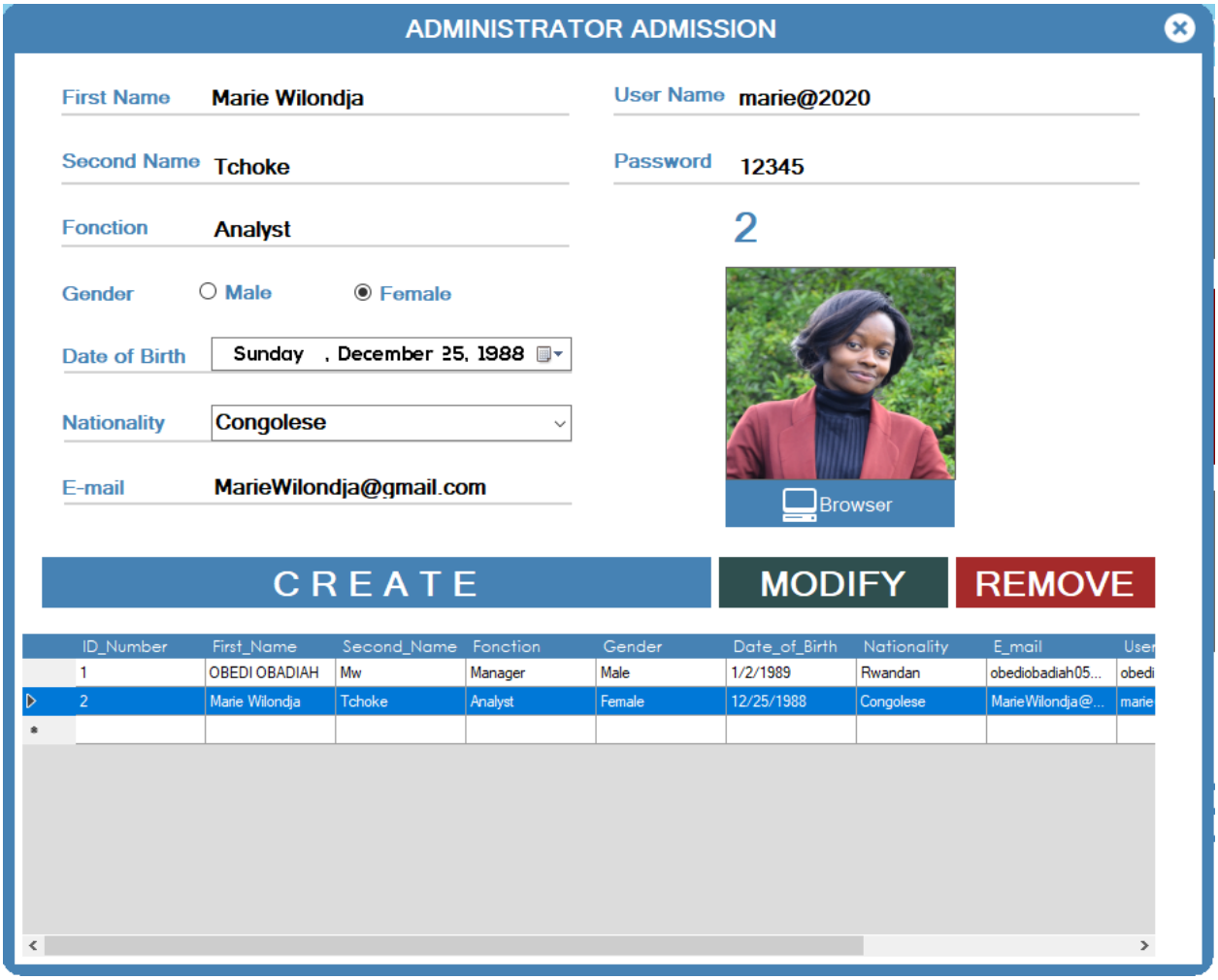
These are Bank Account Details information to be managed:

- ID Number;
- Date of Creation;
- Identifier, which is the name of the account owner;
- Bank account types;
- Limit date(Delay) which appears only when the Bank Account type is the Saving Account;

Once all required informations are filled then the Admin can press "***EDIT"*** button to edit Bank Account saved informations.

The Admin can press "***DELETE"*** button to customer Bank Account saved informations.

Figure 23 The Administrator Registration Interface



Source: *Own drawing*

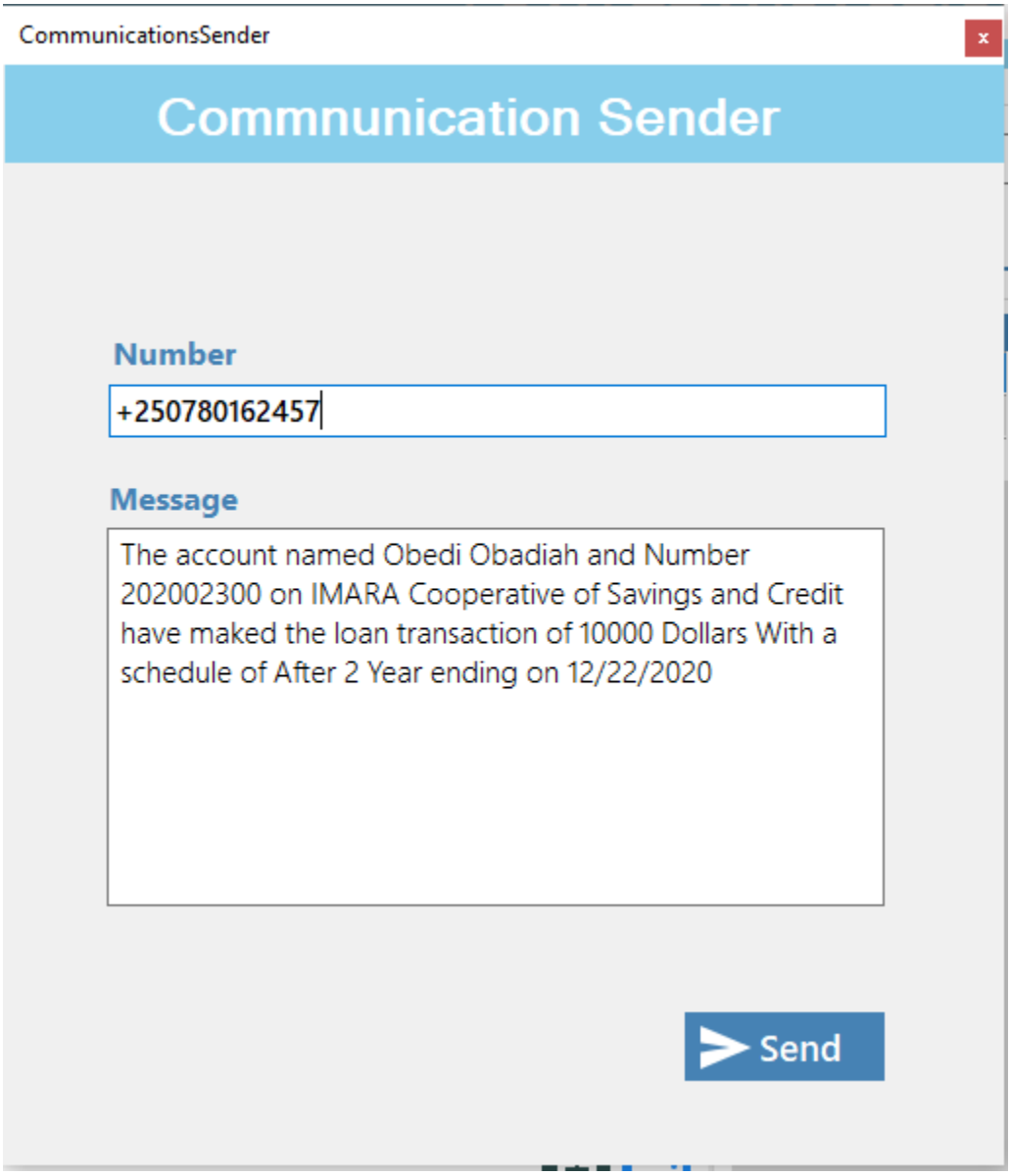
The admin is redirected to the Administrator Registration interface by a simple clicking to the "***ADMIN***" button on the "***Main Form***", where the admin can register or create another administrator account.

These are the Administrator Registration informations to be registered:

- First Name, Second Name, Function, Gender, Date of Birth, Nationality, E-Mail, Username, Password.

Once all required informations are filled then the Admin can press "***CREATE"*** button to create another administrator account.

Figure 24 Communication Sender Interface



Source: *Own drawing*

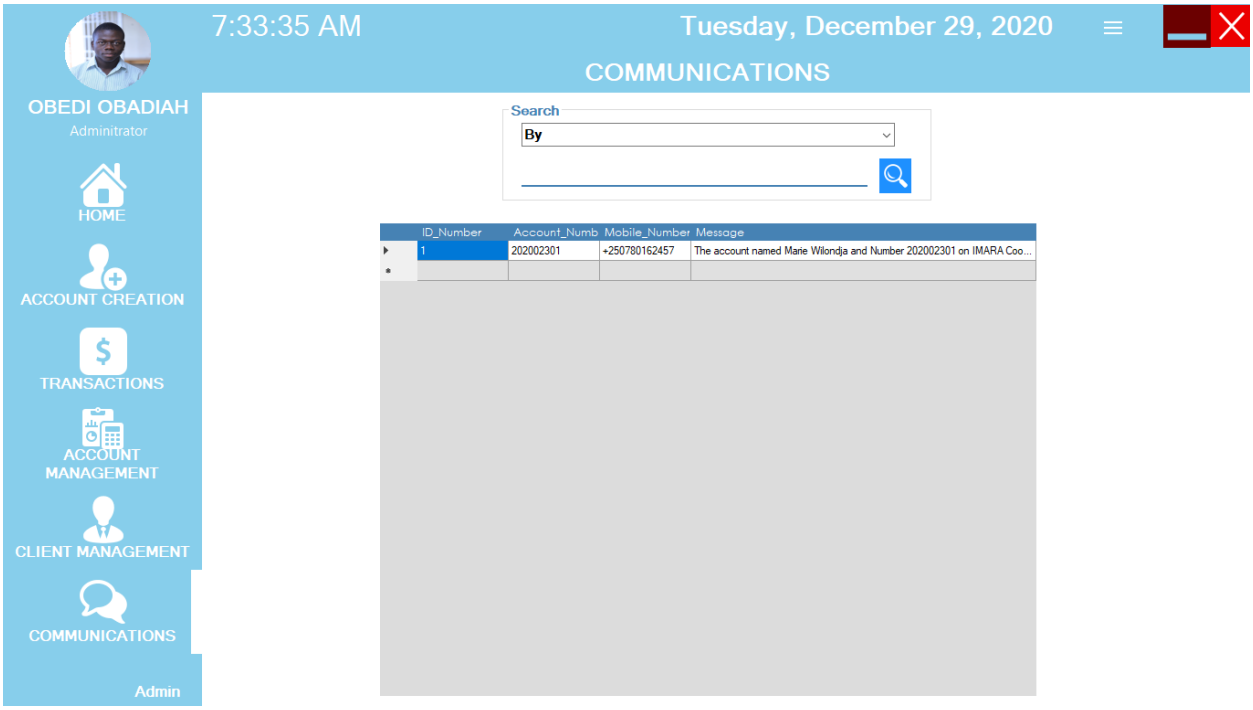
The admin is redirected to the Communication Sender interface by a the end of each basic available services in the system where the admin can send the customers a services feedback message.

These are Communication Sender information to be register:

- **Phone Number** of the customer;
- **Message**, which is the content of the massage to be sent;

Once all required informations are filled then the Admin can press "***SEND"*** button to send the message feedback the customers and to save Feedback information in the datastore.

Figure 25 Communication viewer Interface



Source: *Own drawing*

The admin is redirected to the Communication viewer Interface by a simple clicking to the "***COMMUNICATIONS***" button where the admin can just view all sent services messages feedback available in the system.

CHAPTER 5. CONCLUSION AND RECOMMANDATION

5.1. CONCLUSION

Throughout this work it has been developed a full Bank customers management system that will help bank to manage correctly their customers and to provide good services in order to fight against the time consuming, the waste of resources.

So we can now prove those problems are now going to be solved by the best practices used to design and build the computerized Bank customers management system.

After making the analyze of the current system, we found that it was very important to build a system which will be able to solve the problem. Its development was not only a benefit for banks but also for us who developed it because we have sincerely learned so many things in the interaction of bank services and the desktop applications field and it gave us important experience and more additional knowledge about bank services principles.

At the end of this project we are really satisfied with the achievement and with the knowledge we got through the execution of this project.

5.2.RECOMMANDATION

In the future we recommend to other researchers interested in this project to implement another version of this project and add other important features by improving and making it more larger that a Bank customers management by adding other services such as:

- The customer money transfer;
- The Loan transaction of a group of people and companies;
- Salary payment of companies employees;
- Human resources management.

We also recommend the banks to use this system as it solves several previous problems of it during the execution of tasks.

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